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UNDERGRADUATE CATALOG

THE UNIVERSITY OF ILLINOIS AT CHICAGO CIRCLE

1968-1969

The University of Illinois
at
Chicago Circle

This publication is a record of the 1967-1968 academic year and an announcement of the 1968-1969 academic year.

Contents

Academic Calendar 4
Board of Trustees 9
Administrative Officers 10
Perspective 13
Student Affairs 34
Admission to the University 44
The College of Architecture and Art 67
The College of Business Administration 76
The College of Education 90
The College of Engineering 99
The College of Liberal Arts and Sciences 133
The Division of Physical Education 169
Courses of Instruction 177
Index 325

Academic Calendar

1968-1969

Chicago Circle

Fall Quarter

September 23, 24, M,Tu	Registration and orientation
September 26, Th	Instruction begins
November 28, 29, Th,F	Thanksgiving (holiday)
December 6, F	Instruction ends
December 9-13, M-F	Final examinations

Winter Quarter

January 2, 3, Th,F	Registration and orientation
January 6, M	Instruction begins
March 14, F	Instruction ends
March 17-21, M-F	Final examinations

Spring Quarter

March 27, 28, Th,F	Registration
March 31, M	Instruction begins
May 3, F	Honors Day
May 30, F	Memorial Day (holiday)
June 6, F	Instruction ends
June 9-13, M-F	Final examinations
June 15, Sunday	Commencement

Summer Quarter

June 19, 20, Th, F	Registration
June 23, M	Instruction begins
July 4, F	Independence Day (holiday)
August 29, F	Instruction ends
September 1, M	Labor Day (holiday)
September 2-6, Tu-Sat	Final examinations

Urbana

First Semester

September 9-16, M-M	New Student Program
September 12-14, Th-Sat (noon)	Registration
September 16, M, 7 a.m.	Instruction begins
November 27, W, 1 p.m.	Thanksgiving vacation begins
December 2, M, 1 p.m.	Thanksgiving vacation ends
December 3, Tu	Illinois Day (State admitted to the Union, 1818)
December 21, Sat, 1 p.m.	Christmas vacation begins
January 2, Th, 1 p.m.	Christmas vacation ends
January 11, Sat	Last day of instruction
January 13-21, M, Tu	Semester examinations

Second Semester

January 27-February 1, M-Sat	New Student Program
January 30, 1 p.m. February 1, Th-Sat (noon)	Registration
February 3, M, 7 a.m.	Instruction begins
March 2, Sun	University Day (opened in 1868)
March 29, Sat, 1 p.m.	Spring vacation begins
April 7, M, 1 p.m.	Spring vacation ends
May 2, F	Honors Day
May 24, Sat	Last day of instruction
May 26-June 4, M-W	Final examinations
June 14, Sat	Commencement

Eight-Week Summer Session

June 16, M	Registration
June 17, Tu, 7 a.m.	Instruction begins
August 7, Th	Last day of instruction
August 8, 9, F, Sat	Final examinations

1969-1970

Chicago Circle

Fall Quarter

September 22-26, M-F	Registration week
September 29, M	Instruction begins
November 27-28, Th, F	Thanksgiving vacation
December 5, F	Instruction ends
December 8-12, M-F	Final examinations

Winter Quarter

December 15-19, M-F	Registration week
January 5, M	Instruction begins
March 13, F	Instruction ends
March 16-20, M-F	Final examinations

Spring Quarter

March 23-27, M-F	Registration week
March 30, M	Instruction begins
May 8, F	Honors Day
June 5, F	Instruction ends
June 8-12, M-F	Final examinations
June 14, Sun	Commencement

Summer Quarter

June 15-19, M-F	Registration week
June 22, M	Instruction begins
August 28, F	Instruction ends
August 31-September 4, M-F	Final examinations

Urbana

First Semester

September 8-13, M-Sat	New Student Program
September 11-13, Th-Sat (noon)	Registration
September 15, M, 7 a.m.	Instruction begins
November 26, W, 1 p.m.	Thanksgiving vacation begins
December 2, Tu, 1 p.m.	Thanksgiving vacation ends
December 3, W	Illinois Day (State admitted to the Union, 1818)
December 20, Sat, 1 p.m.	Christmas vacation begins
January 5, M, 1 p.m.	Christmas vacation ends
January 17, Sat	Last day of instruction
January 19-27, M, Tu	Semester examinations

Second Semester

February 2-7, M-Sat	New Student Program
February 5-7, Th-Sat (noon)	Registration
February 9, M, 7 a.m.	Instruction begins
March 2, M	University Day (opened in 1868)
March 28, Sat, 1 p.m.	Spring vacation begins
April 6, M, 1 p.m.	Spring vacation ends
May 1, F	Honors Day
May 29, F	Last day of instruction
May 30, Sat	Memorial Day (holiday)
June 1-10, M-W	Semester examinations
June 20, Sat	Commencement

Eight-Week Summer Session

June 22, M	Registration
June 23, Tu, 7 a.m.	Instruction begins
August 13, Th	Last day of instruction
August 14-15, F, Sat	Final examinations

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of the University of Illinois

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1965-1971
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Chicago Circle

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Dean of Student Affairs ..... Robert E. Corley
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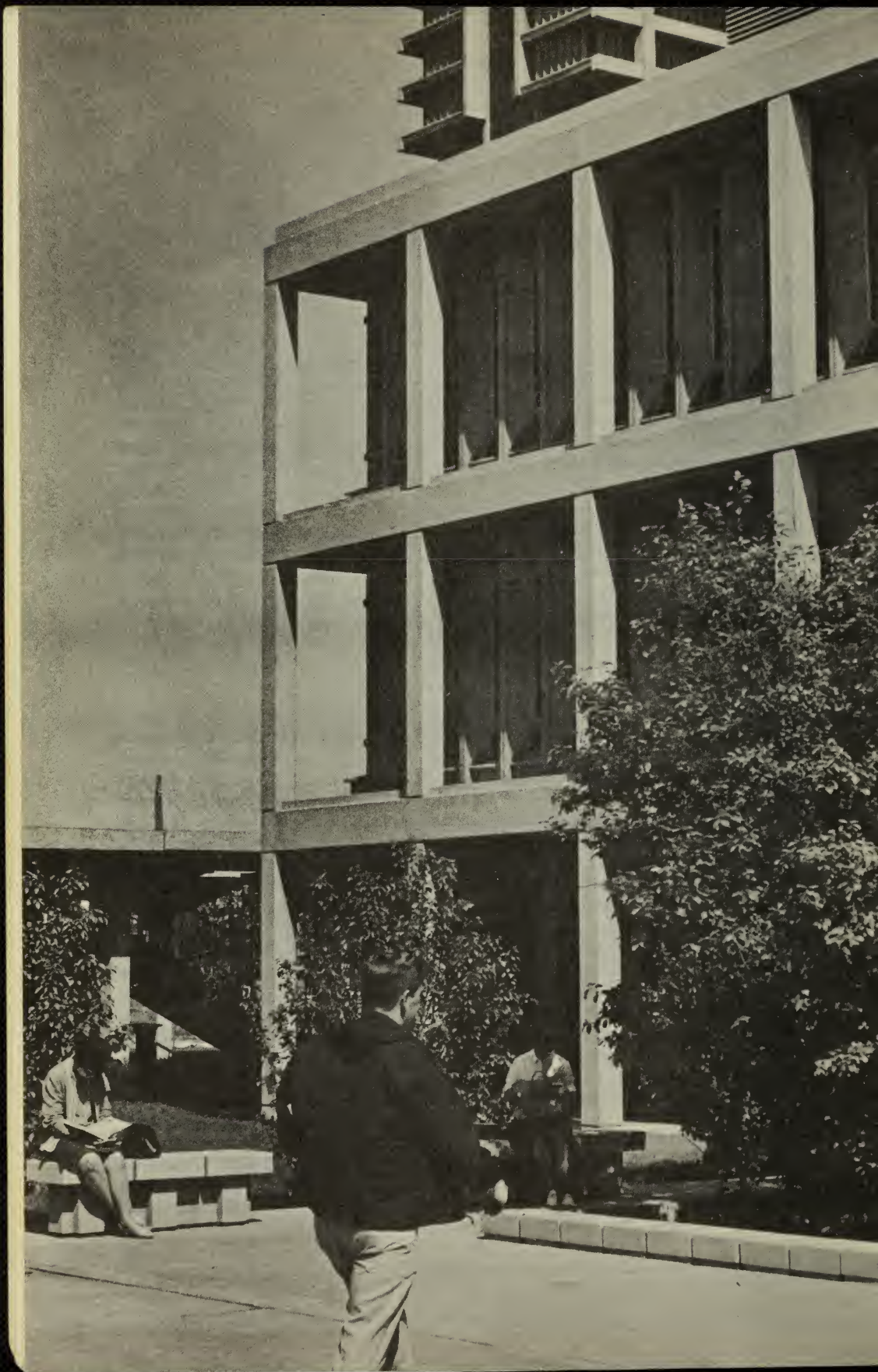
Director, University Honors Programs ..... Robert E. Johnson
Director, Auxiliary Services ..... Vernon L. Kretschmer
Director, Illini Union ..... Earl F. Finder



Perspective

The University of Illinois at Chicago Circle was activated on February 22, 1965, not as a new institution but as the successor to the Chicago Undergraduate Division, through which the University of Illinois for 19 years provided the first two years of college and preprofessional work for over 100,000 college-commuting students of the Chicago area.

In the spring of 1946 the University knew that men and women from the Armed Services would inundate the Urbana-Champaign campus. It was impossible to construct additional facilities in time to meet the demand, and restricting enrollment was undesirable. Therefore, Navy Pier, already used as a school and adaptable to the needs of a freshman-sophomore program, was leased by the Board of Trustees, and the Chicago Undergraduate Division was organized. That fall, 3800 students, three-fourths of them veterans, were enrolled and attended classes of reasonable size taught by competent faculty in quarters at least minimally satisfactory. Without the Chicago Undergraduate Division there would have been no place for most of them to go.

Although the percentage of veterans dropped slightly in 1947, enrollment rose above 4500, for as the wave of veterans moved through the freshman and sophomore years, their places were taken by their nonveteran brothers and sisters.

As the years passed, the need for a four-year campus in Chicago was increasingly evident. In January, 1961, the Board of Trustees approved the granting of baccalaureate degrees by the Chicago Undergraduate Division as soon as an adequate campus was available. The site, where the Eisenhower, Ryan, and Kennedy Expressways converge, was selected in 1961, the Chicago Undergraduate Division became the University of Illinois at Chicago Circle, and the campus was occupied on February 22, 1965.

Work for the baccalaureate degree is offered in the Colleges of Architecture and Art, Business Administration, Engineering, and Liberal Arts and Sciences (the curricula of which include secondary school programs in teacher education) and in the College of Education (teaching in the elementary school) and the School of Physical Education.

The Jane Addams Graduate School of Social Work, under the jurisdiction of the Urbana Senate, offers two years of graduate work.

The Chicago Circle Campus is located just south and west of the Loop in an area bounded by the Eisenhower and Ryan Expressways, Racine Avenue, and Roosevelt Road. The mail address is Box 4348, Chicago 60680. Transportation to the campus is by way of the CTA, which has built a subway station at Peoria Street especially to serve Chicago Circle, and by the buses on Halsted, Harrison, and Taylor Streets and on Roosevelt Road.

Tuition and Fees vary for residents and nonresidents:

Residents of Illinois: $95 per quarter

Nonresidents of Illinois: $288 per quarter

Payment of tuition and fees is made in full when the student registers. However, there is a deferred-fee plan; for information about it, consult the Business Office.

Financial Aid is available in the form of scholarships, loans, and part-time employment. In addition, each student who attends the University is the recipient of a type of scholarship represented by the educational subsidy provided by the General Assembly from tax funds. This large contribution toward the costs of instruction and facilities makes possible the greatly reduced charges for tuition and fees.

Physical Education is required unless the student is a veteran or the University Health Service recommends a waiver on physical grounds or he enters with junior standing. Otherwise, he must complete 6 quarters of physical education. Registration in R.O.T.C. does not exempt students from the requirements in physical education.

The Student Activities Program is carried out by many student organizations. Extracurricular activities are recognized as an important part of campus life and are encouraged as a part of the broad education of the student. These groups sponsor varied activities for the benefit of their memberships and plan programs for the entire student body.

The Student Counseling Service offers vocational, personal, and educational counseling. Counseling and clinical psychologists help students make more effective use of their intellectual and personality resources.

The Athletic Program consists of fourteen varsity sports—football, basketball, baseball, cross-country, fencing, ice hockey, track, wrestling, volleyball, swimming, soccer, gymnastics, tennis, and golf. A special ruling permits freshmen in good standing to participate in varsity sports. An extensive intramural-sports program, centered on more than eighteen activities, serves over 3,000 students each quarter. The Women's Athletic Association and Orchesis offer sports activities and dance programs for women students.

Housing. The University of Illinois at Chicago Circle was developed to serve the needs of students who can travel daily to and from the campus. It is assumed that most students will be living at home with their families, or if minors, in accommodations of which their parents would approve. There are many facilities in the Chicago area that offer activities and supervision similar to those of a residence hall, for example, the Eleanor Clubs (for women), the YWCA, and the YMCA. Whether students live in these facilities or in others is a matter of personal responsibility and /or of agreement between students and their parents.

The University does assist students in finding housing by maintaining a file of available rooms, apartments, and houses. Landlords are responsible only for a pledge of nondiscrimination on the grounds of race, religion, or national origin. A listing is removed when there is evidence that the pledge has been violated. However, the University does not inspect the premises nor verify the accuracy of the statements made by the owners at the time of the referral.

The members of the staff of the Dean of Student Affairs are available for counseling individual students or their parents about special problems in finding suitable living accommodations in the Chicago area.

Cars are used by the students as personal requirements permit. The University parking lots, self-liquidating and self-sustaining projects, are adjacent to the campus.

Fees and procedures for parking will be announced before the beginning of the fall quarter 1968.

Night Classes are not held.

Extramural Courses are offered by the Division of University Extension. The facilities at Chicago Circle are used at night for extramural courses offered under the auspices of the Division of University Extension. Call 663-8650 or 663-2623 for further information. Extramural courses are also offered by the Jane Addams Graduate School of Social Work. For information call 663-7096.

Correspondence Courses are offered by the Division of University Exten-

sion. For information write to the Division of University Extension, University of Illinois, Urbana, Illinois 61801.

Visitors are not permitted in classes unless they register for formal visitor (sometimes called auditor) status and pay the appropriate fees. Permission is sought from the dean of the college offering the course and is granted if the department head recommends it and the instructor consents.

A visitor may not write examinations for credit in courses he has visited.

A visitor may not visit laboratory courses.

Other University of Illinois Facilities in Chicago are at the Medical Center, which houses the Colleges of Medicine (including the School of Associated Medical Sciences), Dentistry, Nursing, and Pharmacy and the Health Sciences Division of the Graduate College.

Information may be obtained from the University of Illinois at the Medical Center, 1853 W. Polk Street, Chicago, Illinois 60612, or by calling 663-7000.

Honors Programs

Programs for superior students are offered in several categories at Chicago Circle beginning in the freshman year. Opportunities for applicants with superior records vary from one college to another because of the comprehensiveness of the curricula offered at the University of Illinois. In the main, a student classified as superior has special advisers and enters special courses or sections of courses as a freshman and as a sophomore; as a junior and senior he is encouraged to participate in special programs for majors in his department. These programs usually include individual work, seminars, and, in some cases, a senior thesis.

The Edmund J. James Scholars are selected from each freshman class entering the University of Illinois and from the currently enrolled freshmen and sophomores. A group of superior students, the James Scholars, are named in honor of one of the University's most distinguished presidents. The James Scholars have available to them resources of the University not normally utilized by the average college student. Honors courses that are consistent with the student's superior ability and that challenge his intellectual development will be made available at an increasing rate; hence, the program offers unusual opportunities for able and industrious students and provides an excellent background for graduate and professional study. A James Scholar is expected to carry at least one honors course every quarter when such courses are available to him. James Scholars may be dropped from the program at their own request or for inadequate scholarship.

Although no monetary award is presently given to James Scholars, most of

them are eligible for one or more of the scholarships that are available through national, state, or University sources; hence, James Scholars who need financial assistance should apply for monetary scholarships.

Seniors in Illinois high schools who have demonstrated high academic potential are eligible to apply for admission to the James Scholar Program. Applications from students in high schools outside the state are also considered. Students who have already been graduated from high school are eligible as entering freshmen; students who were not initially chosen as freshmen may be admitted to the program later. The final selection of James Scholars is made on the basis of high school grades, performance in aptitude and achievement tests, other test scores, and the recommendation of high school principals and counselors. Students in residence are chosen on the basis of their performance in college and the recommendations of their instructors.

Further information about the James Scholar Program and an application for designation as such may be obtained by addressing the Director, University Honors Programs, Room 708 Chicago Circle Center, University of Illinois at Chicago Circle, Box 4348, Chicago, Illinois 60680.

The Freshman Core Program. Concentration of effort and depth in learning through methods adapted to superior students and through integration of course offerings are the basis of this program, which extends through the entire freshman year. For two quarters the student registers in rhetoric, humanities, history, and an accelerated beginning language course. In the third quarter when he has completed rhetoric, he may choose one elective or begin a science sequence. Readings in humanities, rhetoric, and language are selected from the period covered in the history courses. A special laboratory program explores the nature and structure of language and compares English with the foreign language studied. At the end of the year the successful student will have satisfied graduation requirements in rhetoric, the humanities, and the social sciences and will have completed the equivalent of four quarters of a foreign language not previously studied.

Humanities 106, 107, 108, Rhetoric 111, 112, German 121, 122, 123, and French 121, 122, 123 are honors courses restricted to students in the Core Program. The student must choose a language he has not studied in high school. In addition, he must register in a regular section of History 111, 112, and 113 unless he has advanced-placement credit in European history. Students with advanced standing in Rhetoric 101 must take both Rhetoric 111 and 112. There is no exemption from rhetoric in this program, but the advanced-standing credit is not forfeited. Humanities 106, 107, and 108 may be substituted for English 151, and 152 as prerequisites for advanced courses in English if the student takes English 150.

Any candidate for admission to the College of Liberal Arts and Sciences who has achieved a commendable record in his high school work and a sufficiently high score on a standardized college entrance examination may apply

for admission to this program. Application blanks can be obtained at the Honors Office. Applicants will be asked to take a qualifying examination to test their linguistic aptitude before they are finally admitted to the program. Students are admitted to the program in the fall quarter only and are expected to continue for the entire year. Sophomores may be admitted if the Core Program Committee consents.

Academic Honors

Recognition for superior academic achievement at Illinois is given by the University and by the college and department in which a student is enrolled.

To be considered for academic honors in any quarter, a candidate must be a full-time student—one who completes 12 academic hours exclusive of required physical education, basic military science, courses in which he has ex-

cused or deferred grades, (except in an honors course), and courses completed by an examination for which "pass" is recorded.

The Honors Day Convocation annually gives public recognition to superior undergraduate students. The printed program for this convocation contains the names of those students who have been on the Dean's List of their colleges for at least three of the four quarters since the last Honors Day Convocation. If a student has been in residence all four quarters, he must have a cumulative grade-point average of 4.000 (B) or more in addition to being on the Dean's List for three of the four quarters.

The names of new freshmen or of transfer students who enter in the fall quarter will be included if they have been on the Dean's List for the fall and winter quarters preceding the Honors Day Convocation.

Transcripts prepared for these students will carry the notation, "Honors Day Recognition, 19—."

Edmund J. James Scholars who have maintained since the last Honors Day Convocation the academic record required by the James Scholar Program will also be listed in the Honors Day program. The transcripts of these students will carry the notation, "Edmund J. James Scholar, 19—."

The Dean's List for the colleges and divisions is composed each quarter of those full-time students who have an average of B (4.000) or better in all courses, exclusive of basic military science and required physical education. This list is posted in the college offices and is sent to the Office of Public Information for distribution to the press.

Graduation with Honors

The Chicago Circle Senate and the Board of Trustees establish the criteria under which students are awarded departmental, college, and University honors.

Departmental Honors (Departmental Distinction) may be awarded if the student has met the criteria established by the department in which he completes his major and by his college. His diploma will carry the designation Distinction, High Distinction, or Highest Distinction, as appropriate.

General College Honors are awarded the student recommended by his dean by virtue of a sufficiently high scholastic average and the fulfillment of scholastic and other conditions determined by the college from which the student will be graduated. His diploma and his transcripts carry the notation of such an award.

Graduation with College Honors gives the student a favorable position when he is considered for a graduate fellowship, an unusual job-placement opportunity, or any other competitive situation.

The Book of Academic Honors carries the names of those students who have at least a 4.500 cumulative average, from college entrance through the quarter prior to graduation, for all work taken at the University, exclusive of basic military science and required physical education, and who are in the top 3 percent of the students in their college who will be graduated with them. A transfer-student candidate for listing in the Book of Academic Honors must have earned 60 or more quarter hours at Illinois and have an Illinois cumulative average and a total cumulative average as high as the lowest average listed for those honors candidates in his college who have completed all work at Illinois.

Valedictorian and Salutatorian. The Chicago Circle Honors Committee designates the valedictorian and the salutatorian for each graduating class. Their selection procedure is as follows:

1. Each dean is requested to submit to the Chicago Circle Director of University Honors Programs the names of the three undergraduate degree candidates who have the highest cumulative grade-point averages in their respective colleges.
2. All grade-point averages are personally checked by the campus Director of University Honors Programs.
3. The students from all colleges are listed in descending order of grade-point averages.
4. The highest eligible student is designated valedictorian. The second highest eligible student is designated salutatorian.
5. Students whose grade-point averages are tied are designated covaledictorians and cosalutatorians.

Special Honors

Additional prizes and awards are made to both undergraduate and graduating students who have meritorious records.

Alpha Lambda Delta and Phi Eta Sigma are freshman honor societies. Women who earn an average of 4.500 in 12 hours of academic work during their first quarter or an average of 4.500 in 36 hours during their first year may be initiated into Alpha Lambda Delta; men whose average is 4.500, based upon 12 or more hours in the first quarter or 4.500 for the entire freshman year, are eligible for membership in Phi Eta Sigma. Both organizations are national honor societies.

The Gordon Lee Goodman Award for Distinction in Undergraduate Studies in History. Friends and relatives of the late Gordon Lee Goodman, associate professor of history at the University of Illinois at Chicago Circle, have established a fund in his memory "to support excellence in the undergraduate program in history." Annually the Department of History at Chicago Circle designates at least one and not more than four Gordon Lee Goodman Scholars in History. The student must have attained or be about to attain senior standing, must be a major in history, and must have demonstrated excellent scholarship in the discipline. Designation as a Gordon Lee Goodman Scholar in History carries a stipend that will be paid from the income of the memorial fund. The Department of History maintains a permanent record of all who have been named Gordon Lee Goodman Scholars in History and will identify students so named in all appropriate University announcements and publications.

The Ernest C. Van Keuren Award for excellence in the humanities.

The B. B. Freund Award for excellence in chemistry.

The Roscoe E. Harris Award for excellence in physics.

The National Council of Alpha Lambda Delta Award, made to the highest ranking senior of the chapter.

The Talented Student Program for Illinois High School Seniors

Upon completion of the junior year in high school superior students who can meet University requirements may attend University classes for college credit in one or more of the four quarters at Chicago Circle or they may enroll for college credit in extramural courses or in correspondence courses offered by the Division of University Extension. Each case is considered individually, and the Director of Admissions and Records, the dean of the college concerned, and the department offering the course must concur in the high school's recommendation as the condition for acceptance. (See 1, 2, and 3 following.)

Ordinarily, such work taken at the University of Illinois should not be used to accelerate the high school work of a secondary-school student but should be used as a means of broadening and enriching the student's educational program. These students are expected to complete all high school courses required for graduation. The courses taken at the University by superior high school seniors are over and above the regular secondary-school curriculum.

Grades and course credits are recorded on the student's permanent University of Illinois record and appear on any official transcript issued to or for him. If the student enters the University after being graduated from high school, the courses are credited toward University graduation if they are applicable to the chosen degree program.

Students applying for admission to extramural or resident courses under the provisions of this program should arrange for the following materials to reach the Office of Admissions and Records within the deadline periods established for other admissions:

1. A recommendation from the high school principal, specifically endorsing the student for admission to a particular course or courses.
2. A completed application for admission.
3. An official copy of the high school transcript covering all work thus far completed in high school, including a record of courses in progress (if applicable), and the most recent rank in class. This transcript should be accompanied by any available test scores on such examinations as those conducted by the College Entrance Examination Board and the American College Testing Program (ACT). However, these tests are not required.

For applications and information for prospective students for this program of study, inquiry should be made to the Director of Admissions and Records, University of Illinois at Chicago Circle, Box 4348, Chicago, Illinois 60680.

Correspondence Study. High school students who wish to pursue such study should write directly to the Division of University Extension, University of Illinois at Chicago Circle, Box 4348, Chicago, Illinois 60680, for their application instructions. Inquiry should be made at least two weeks prior to the beginning of any session in which they wish to pursue correspondence study. For the summer months, applications should be submitted no later than the middle of May.

Proficiency Examinations For Enrolled Students

Each quarter the University gives proficiency examinations, similar to regular quarter examinations, in courses ordinarily open to freshmen and sophomores. Proficiency examinations for Rhetoric 101 and 102 are scheduled regularly. In other subjects the student must obtain the consent of the head or chairman of the department concerned. Proficiency examinations in more advanced undergraduate subjects may also be given if the head or chairman of the department recommends and the dean of the college concerned approves. There is no fee for these examinations.

The grade given in the proficiency examinations is either "pass" or "fail," but no student receives a "pass" unless he has made at least the equivalent of a C. Neither grade is included in the computation of the student's average, and no official record is made of a "fail."

A student who passes a proficiency examination is given the amount of credit toward graduation regularly allowed in the course if the course is acceptable in his curriculum. However, if such credit duplicates credit counted

for his admission to the University, it is not allowed. Proficiency examinations are given only to:

1. Persons who are in residence.
2. Persons who, after having been in residence, are currently registered in a correspondence course.
3. Persons who are degree candidates at the University and need no more than 15 quarter hours to complete their degree requirements.

Proficiency examinations may *not* be taken:

1. By students who have received credit for more than one quarter of work in the subject in advance of the course in which the examination is requested.
2. To raise grades or to remove failures in courses.
3. In a course the student has attended as a listener or as a visitor.

The Library

Louis A. Schultheiss, M.A., Acting Director of the Library; Head, Technical Services Division
Giles B. Robertson, M.A.L.S., Head, Public Services Division
Glenn R. Scharfenorth, M.A.L.S., Assistant to the Director

Professors

Giles B. Robertson, M.A.L.S.; Louis A. Schultheiss, M.A.

Associate Professors

Allen J. Hogden, M.A.; Marie A. Rapp, B.A.L.S.

Assistant Professors

Robert J. Adelsperger, M.S.; Harriet K. Barlow, M.S.; Lloyd Engelbrecht, M.S.L.S.; Martha Kester, M.S.; Mary Lynn McCree, M.A.; Evelyn Moore, M.S.L.S.; Richard Seidel, M.L.S.

Instructors

Aivars Aistars, M.A.; Mary A. Bamberger, M.A.; Marjorie Bengtson, M.S.; Floris F. Berger, M.S.; Jeraldine Byrne, M.A.; Deirdre A. Darling, M.L.S.; Donald Draganski, M.A.L.S.; Cynthia Faber, M.A.L.S.; Aline Fairbanks, M.S.; Walter L. Grantham, M.A.L.S.; Mary Ellen Hulshof, M.A.L.S.; Judith G. Jenkins, M.A.; Linda Tzeng Lee, M.S.L.S.; Marvin O. Meier, M.A.L.S.; Yuri I. Nakata, M.A.; Gladys C. Odegaard, M.A.L.S.; Suzanne J.

Peterson, M.A.L.S.; Glenn R. Scharfenorth, M.A.L.S.; Richard A. Sherwood, M.A.L.S.; Ghada H. Talhami, M.A.

The University Library provides those books, periodicals, and related materials required to meet the instructional needs of the students. Library collections also contain materials necessary to keep the faculty informed in their respective fields of interest and scholarly activity.

On July 1, 1967, the book collection totaled 213,471 volumes, including 33,320 volumes of bound periodicals. The Library currently receives 3,164 periodicals. The Library has been a depository for United States government documents since 1957 and presently contains some 88,992 items. The map collection consists of 42,096 topographical, army, and state highway maps. Numerous materials are available in microfilm or microprint.

Materials placed in the reserve collection are located on the first floor. General periodicals, books in the fields of bibliography, religion, philosophy, and psychology, together with government documents, are shelved on the second floor. On the third floor are the collections in the social sciences and humanities, maps, rare books, and microforms. Books and periodicals in the fine arts and in the pure and applied sciences are on the fourth floor, as are facilities for listening to records and tapes.

The Department of Special Collections administers, together with the Library's maps and rare books, a rapidly growing collection of manuscripts. Included are materials in the fields of social welfare, politics, and labor, and those relating to various religious and ethnic groups in Chicago. Among the latter are the records of the Chicago Urban League, the Juvenile Protective Association, the Illinois Humane Society, the Chicago League of Women Voters, and the Metropolitan Housing and Planning Council of Chicago. The Jane Addams Memorial Collection, located in the Dr. Preston Bradley Library in the restored Jane Addams' Hull House on the Chicago Circle Campus, contains books, manuscripts, and memorabilia dealing with Miss Addams' life and work and with the social welfare movement. All such materials are available to faculty and graduate students for research. Undergraduates may use the collection upon the recommendation of the student's professor and the consent of the pertinent department.

A detailed outline of the general collections and suggestions for effective use of the Library will be found in the Library Handbook, available at all Library service desks.

The Speech Clinic

Students who wish assistance in correcting speech difficulties, including those arising from foreign accents, hearing deficiencies, and vocal or articula-

tory problems, should avail themselves of the services of this clinic. There are no fees for these services. The clinic is located in 202 Grant Hall.

The Office of Instructional Resources

The Office of Instructional Resources is the agency responsible for planning, developing, and, when appropriate, administering technological aids to instruction and for advising and assisting the faculty in using these aids to improve the effectiveness and efficiency of instruction.

The Programmed Instruction Division works with faculty members in developing programmed instruction for academic courses and in locating and using programmed materials from outside sources.

The Course Development Division works with departments in the design and coordination of course experimentation.

The Television Division produces and distributes instructional television presentations and supports other television applications in teaching.

The Audio-Visual Division operates an instructional materials availability center and a professional facility for making slides, overhead transparencies, photographic prints, exhibits and related materials, including graphic work when required.

The Engineering and Technical Services Division operates and maintains television and audio production and recording facilities and provides campus services for projection of motion pictures and maintenance of audio-visual equipment.

The Office of Instructional Resources is housed in the Library.

The Computer Center

Large-scale electronic computers are now in widespread use as a research tool in nearly all scholarly disciplines. Recognizing this, the University has established a Computer Center that is charged with administering a facility to meet the educational and research needs of the University. A grant from the National Science Foundation has enabled the University to greatly expand its computing resources on the Chicago Circle campus as of September, 1967, when an IBM 360 model 50 computer with 262,544 bytes of core storage was placed in operation. Facilities have subsequently been expanded to include bulk core storage, increased disk capacity, and a process control computer for on-line monitoring of laboratory experiments.

The staff members of the Computer Center teach courses in programming and numerical analysis in cooperation with the Department of Mathematics and the College of Engineering. The staff also assists other departments in utilizing the equipment for both teaching and research throughout the campus.

Hospital-Medical-Surgical Insurance

All students enrolled and in attendance at Chicago Circle are covered by this insurance, for which they pay a fee of $6 per quarter at registration. Eligible dependents of insured students (spouse and/or unmarried dependent children under nineteen years of age) may also be insured if the student makes application to the University Cashier (4th Floor University Hall) within the time specified by the insurance policy.

Students enrolled in the spring quarter but who will not attend summer quarter may elect to take the insurance for the entire summer quarter by making application to the University Cashier between May 15 and the fifth day of instruction in the summer quarter. The insured student's eligible dependents may also be included in this coverage.

To provide continuous protection, coverage will extend from the beginning of a quarter through the first day of classes for the next quarter. See the policy certificate for beginning and terminating dates of coverage.

Claims must be initiated in the Student Insurance Office, Room 420 University Hall. See also *The Hospital-Medical-Surgical Insurance Fee.*

The Jane Addams Graduate School of Social Work

The School offers two years of graduate study leading to the professional degree of Master of Social Work. The School, established in 1944 and accredited in 1946 is headquartered in Urbana. However, a full program is offered on the Circle campus as well as in Urbana.

Social work is a relatively new and growing profession, concerned with the restoration, maintenance, and enhancement of social functioning. It contributes, with other professions and disciplines, to the prevention, treatment, and control of problems in social functioning of individuals, groups, and communities. Social work offers a fascinating, creative, and varied career, an opportunity to serve one's fellows in a democratic way, and the challenge of a new field of human relationships.

The social worker derives his knowledge from a variety of sources and in its application develops new insights and further knowledge. The social worker is guided by understanding of human development and behavior, the psychology of giving and receiving help, the ways in which people communicate, group processes, the meaning of cultural heritage and its effect on individuals, groups, and communities, the relationships and interactional processes among individuals, between groups, and between groups and individuals, the community—its internal processes, modes of organization development and change, and its social services and resources—the social services structure, organization and method, and himself, as a social being and as a practitioner.

Required Preprofessional Education. A baccalaureate degree from an accredited college is required for admission to the School. A well-rounded undergraduate program of study in the liberal arts is preferred. Preference is given the student whose background includes such courses as social anthropology, economics, political science, psychology, sociology, history, philosophy, education, and statistics. Competence in written and oral expression is important to the social worker, and appropriate study is advised.

Undergraduates interested in learning more about the field of social work or who desire help in planning for entry into the School are urged to consult the Student Counseling Service at the Chicago Circle campus or the Jane Addams Graduate School of Social Work, 1300 University Hall, University of Illinois at Chicago Circle, P.O. Box 4348, Chicago, Illinois 60680.

The Reserve Officers' Training Corps

The principal objective of the college-level Reserve Officers' Training Corps program is to develop commissioned officers for the Army Reserve and the Regular Army. It is specifically designed to enable potential leaders to prepare themselves for effective service in the Army and also offers individuals training in developing the essential qualities of leadership required for success in either a civilian or a military career.

Participation in the college-level R.O.T.C. program is offered on a voluntary basis to qualified male students. Requirements for enrollment are:

1. United States citizenship. An alien may pursue the course if he presents written evidence of his intent to become a citizen.
2. Classification as a full-time student.
3. Ability to qualify for appointment as a second lieutenant before the candidate is 28 years of age.
4. Physical qualifications for a commission.

A student entering the University after successfully completing military training in high school or in a preparatory school that has an accredited Junior Division R.O.T.C. program will be entitled, upon enrollment, to such placement as may be determined by the Professor of Military Science. However, in no case will this placement exceed the first year of the Basic Course.

Basic Course credit may also be awarded for active duty with any of the military services. For conversion purposes, each six-months of active duty is considered equivalent to one year of the Basic Course.

Instruction is offered through two programs: a four-year and a two-year. The four-year program consists of the Basic Course (the first two years) and the Advanced Course (the last two years). The two-year program alone consists of the Advanced Course and prior attendance at Basic Summer Camp. Both programs include attendance at Advanced Summer Camp between the junior and senior years. Cadets are issued uniforms, textbooks, and equipment necessary for the R.O.T.C. program.

The Basic Course. Freshmen normally devote two hours a week to military instruction, which consists of one hour of theory and one hour of leadership laboratory. In addition, the cadet must enroll in a nonmilitary course in one of the following four categories: effective communications, science comprehension, general psychology, or political development and political institutions. This course may be one required for graduation by the cadet's college. Sophomores normally devote three hours a week to military instruction—two hours of class and one hour of leadership laboratory.

The Advanced Course. All cadets who have successfully completed the Basic Course, meet the physical and academic requirements, and pass an officer-qualification test and a physical examination are eligible for selection by the Professor of Military Science for the Advanced Course. A cadet selected to enroll in the Advanced Course without prior enrollment in the Basic Course must successfully complete the Basic Summer Camp before such enrollment and have the approval of the Professor of Military Science.

Advanced Course cadets must attend an Advanced Summer Camp, normally between the junior and senior years.

A subsistance allowance of not less than $50 per month is paid to each

cadet in the Advanced Course except during attendance at summer camp, when he is paid the same rate as is a cadet at the United States Military Academy ($151.95 per month) plus a travel allowance to and from camp at government expense. Meals, housing, medical care, uniforms, and all equipment are also furnished.

Commissioning. Upon successful completion of the Advanced Course and completion of the degree requirements, cadets will be commissioned as second lieutenants in the United States Army Reserve, and a few may be offered a commission in the Regular Army. A student may select from the following list the branch of the Army in which he desires to serve.

Adjutant General's Corps
Armor
Army Security Agency
Artillery
Chemical Corps
Finance Corps
Corps of Engineers
Infantry
Medical Service Corps
Military Intelligence
Military Police Corps
Ordnance Corps
Quartermaster Corps
Signal Corps
Transportation Corps

Deferment from selective service is granted until completion of the R.O.T.C. program to those cadets who are qualified and are approved by a deferment board composed of military personnel and civilian faculty. If they maintain the required standards, students will retain their deferment throughout the course in military science.

Further information on the program is obtainable by calling 663-3452 or by visiting the Military Science Department, 203 Roosevelt Road Building.

General University Requirements

The academic year consists of two semesters (Urbana) or three quarters (Chicago Circle and the Medical Center). Requirements are generally stated in terms of full-time programs. Semester hours are converted to quarter hours by multiplying by $\frac{3}{2}$. Quarter hours are converted to semester hours by multiplying by $\frac{2}{3}$.

Requirements for Graduation

Regardless of the college and curriculum in which he is enrolled, each student must fulfill these specific requirements if he is to be graduated:

1. He must meet the admission requirements.

2. He must remove all deficiencies in entrance credit.
3. He must demonstrate that he is proficient in written English by earning grades of A or B in Rhetoric 102 or by passing a proficiency examination or the equivalent. Literature courses do not constitute an equivalent. If his grade in Rhetoric 102 is C or D, he must pass the English Qualifying Examination. *A degree will not be granted unless one of the above conditions is met.* A transfer student may be certified by the Office of Admissions and Records as having been exempted without credit from the equivalent of Rhetoric 102 while previously attending a fully accredited institution.
4. He must earn six quarters of credit in physical education unless he is a transfer student with 90 or more quarter hours of transfer credit or is a veteran.
5. He must fulfill the general education requirements of a *minimum* of 9 hours in the humanities, 9 hours in social science, and 9 hours in natural science. However, the Colleges and Divisions are authorized to increase these minimum requirements. Consult the graduation requirements of the Colleges and Divisions for variations. These general education courses, which must be taken in approved sequences, determined in consultation with the appropriate college office, provide a broad educational base for the major and minor (Liberal Arts and Sciences), for a field of specialization (Business Administration), for the selected option (Art and Architecture, Engineering), or for work in the College of Education and the School of Physical Education.
6. He must meet all of the graduation requirements of the college in which he is enrolled.
7. He must earn the required grade-point average of 3.000 (C) in all courses offered for the degree and in all courses taken at the University of Illinois.
8. He must satisfy the residence requirement: Either the first 135 quarter hours or the last 45 quarter hours of University work must be taken at Chicago Circle.

For the specific college requirements that must also be met, see the sections of this Catalog devoted to the colleges.

Concurrent, or Dual, Registration—In general, it is considered scholastically hazardous to enroll concurrently at both a division of the University of Illinois and another accredited institution. A student contemplating such concurrent enrollment must get approval from the dean of his college before he can so register.

Degrees

A degree from the University of Illinois is awarded by action of the Board of Trustees on recommendation of the appropriate College and Senate. The student receives the degree in a stated curriculum and the graduation require-

ments in effect for that curriculum at the time of the student's initial admission to it become his graduation requirements, unless he elects to meet a later set, should such be initiated.

Approval of any necessary substitutions in graduation requirements rests with the College in which the student is enrolled.

The degree for each major is stated, together with the degree requirements, in the appropriate college section of this Catalog.

Quarter Hours

A University quarter hour represents one classroom hour of fifty minutes weekly for one quarter in lecture or recitation, and either the necessary preparation time or a longer time in laboratory or other work. It is expected that most students will spend two hours preparation for one hour per week of lecture or recitation. Each University quarter hour of credit is thus understood to represent at least three hours of the student's time, and the credit value of a course is calculated in quarter hours on that basis. The number of quarter hours allotted each course is listed immediately after the course title in the "Courses of Instruction" section. "English 113. American Literature, I. 4 hours" is an example. The number of quarter hours earned by the student determines, during his undergraduate period, his classification within the University.

45 quarter hours—sophomore standing
90 quarter hours—junior standing
135 quarter hours—senior standing

Note: 180 quarter hours constitute the minimum required for a degree. The required number of hours varies within the colleges and curricula. The student should refer to the section of this Catalog covering his college and curriculum to determine the hours requirement for his particular degree. His college office will also provide this information.

The Grading and Grade-Point Systems of the University

These systems should be thoroughly understood by each student seeking a degree. Six grades and three symbols are used.

Grades:

A—Excellent
B—Good
C—Fair
D—Poor
E—Failure
Ab—Failure because of absence from the final examination without excuse

Symbols:

W—Withdrawn, without penalty, from the course.

Ex—Excused from the final examination by the instructor or by the dean; status undetermined until the examination is written. An Ex grade must be made up by the end of the quarter following that in which it was received or it automatically becomes an E.

Df—Grade deferred (independent study courses only).

Grade Points. Each grade has a specific value, which is expressed in grade points. When the grade-point average is computed, the following weights, or values, are used for each grade:

A—5 grade points
B—4 grade points
C—3 grade points
D—2 grade points
Ab and E—1 grade point each

Computing the Grade-Point Average. Multiply the number of hours of each grade by the weight, add the products, and divide by the number of hours. Below is a grade-point computation for a student who has earned 3 hours of A, 6 hours of B, 3 hours of C, 2 hours of D, and 4 hours of E.

Grade	Hours	Weight	Grade Points	
A	3	5	15	
B	6	4	24	
C	3	3	9	
D	2	2	4	
E	4	1	4	56
	—		—	— = 3.111
	18		56	18

The student's grade-point average is 3.111.

Electives

The terms "restricted electives" and "free electives" must be understood thoroughly if errors in scheduling are to be avoided.

Restricted Electives. While they differ from required courses, which must be taken by all students in a given curriculum, some electives are nevertheless restricted in scope and pertain to an area within which limited choice is permitted. For example, electives in general education are restricted to approved sequences.

Free Electives. After the University and the college requirements for graduation have been fulfilled, the student may still need to enroll in additional courses to earn the minimum number of hours needed for his degree. These additional hours are earned by enrolling in courses classified as free electives

for those for whom they are not required. The value of free electives lies in the further broadening they provide for the student's total education.

Transfer and Withdrawal

Transfer to and from Urbana is governed by specific regulations. Since Urbana is on the semester system and Chicago Circle is on the quarter system, such transfer is most easily made at the end of the student's year. A student at Chicago Circle who intends to transfer to Urbana may do so by securing a release from the dean of the college in which he is enrolled. This release is then presented to the Office of Admissions and Records, which will transfer the necessary records to Urbana. There is no fee for this transfer.

A student who transfers to Urbana for the fall semester must comply with the Urbana application deadline.

A student at Urbana who wishes to transfer to Chicago Circle should obtain a copy of the Chicago Circle Application from the Office of Admissions and Records at Urbana or at Chicago Circle.

Withdrawal from the University is also governed by specific regulations that the student should observe to protect his academic standing. A student who leaves the University before the end of a session must obtain withdrawal papers from the office of the college in which he is enrolled. If he does not do so, he will be failed in all courses and will be on dropped-for-poor-scholarship status at the end of the quarter.

Withdrawal to Enter Military Service. If withdrawal occurs during the first six weeks of instruction, the student does not receive any academic credit. If withdrawal occurs during the seventh or eighth week of instruction, he will receive one-half credit in those courses in which his grades are C or better at the time of withdrawal and W (withdrawn without penalty) in those courses in which his grades are below C. After the eighth week full credit is allowed for all courses in which he is earning C or better, and W is recorded for courses in which he is receiving grades below C. See page 66 for a statement of refunds of tuition and fees.

When a student withdraws from the University to enter military service, he must be on active duty within ten days after withdrawal if he is to benefit from the foregoing rules, and it is his responsibility to present to the University proof of the fact. The most effective way of presenting such proof is to have the personnel officer of the unit to which he is assigned certify to the University the date of the student's assignment to active duty.

Student Affairs

Robert E. Corley, Ph.D., Dean of Student Affairs.
Lawrence T. Butler, M.A., Assistant to the Dean of Student Affairs.
Warren O. Brown, B.S., Dean of Men.
Harry F. Rodman, M.A., Assistant Dean of Men.
Agnes G. Tandberg, M.A., Dean of Women.
Judith Rosenbaum, M.A., Assistant Dean of Women.
Arthur J. Falls, B.S., Director of Student Financial Aid.
Aphrodite F. Sarelas, M.A., Coordinator of Student Employment Services.
James R. Webb, B.A., Coordinator of Scholarships and Grants.
Laurette A. Kirstein, M.A., Coordinator of Foreign Student Affairs.
Jacob Goldberg, M.A., Assistant Coordinator of Foreign Student Affairs.
John E. Kysar, M.D., Director of Student Health Services.
Daniel J. McCarthy, M.D., Assistant to the Director of Student Health Services.
Roland Swaim, Ed.D., Coordinator of Placement Services.
Harold Klehr, Ph.D., Director of Student Counseling Services.
Seymour S. Raven, M.Mus., Director of the Office of Organizations and Activities.
Susan Erskine, M.A., Assistant Director of the Office of Organizations and Activities.

The academic life of the student is supervised by the dean of the college in which the student enrolls; however, the University's interest in the individual extends beyond the classroom to include his personal welfare and his orientation to college life.

The Dean of Student Affairs

The Dean of Student Affairs is a major officer of the University. He reports directly to the Chancellor and helps in the formulation of policy that governs student affairs; he also works closely with other members of the administrative staff, with Student Government and other student organizations, and with the faculty Senate Committee on Student Affairs. His office is responsible for coordinating the activities and functions performed by the Offices of the Dean of Men and the Dean of Women, Financial Aid and Student Employment, Foreign Student Affairs, Organizations and Activities, Placement, Student Counseling, and Student Health Services. The Office of the Dean of Students, along with the offices listed above, should be regarded as the principal point of contact between the individual student, the student organizations, and the University Administration. Problems faced by students in their adjustment to the University, including their relationships to each other, to extracurricular activities, to their college offices, to the University police, or to other administrative agencies may be brought to this or to any of the above offices for help in their resolution.

Academic and Other Regulations

The student should familiarize himself very early with the University and with the customs and policies of this campus. Each incoming student receives a copy of the *Student Handbook,* which provides information about the University. The student has a personal obligation to be familiar with its contents.

The Dean of Men and the Dean of Women

These officers and their staffs are available daily for conferences with students or with their parents. The Dean of Men and the Dean of Women also work closely with various student activities and organizations from their offices on the eighth floor of University Hall.

The Student Counseling Service

Counseling and psychological testing are available to the student, and it is his privilege to make use of the following services whenever the need arises.

Educational, Vocational, and Personal Counseling are available to any student who is uncertain about his choice of college, curriculum, or major or who needs help in choosing his occupation or who is having personal problems.

Freshman Guidance Examinations, followed by a counseling appointment,

are offered to all graduating high school seniors who have completed the American College Test (ACT), which is required of applicants for admission to the University.

Pre-entry Counseling is offered to the graduating high school senior or to the transfer student to help him determine the college and the curriculum of the University that best meet his needs, to formulate his educational and vocational goals, and to clarify his thinking on how to make a good start in his college work.

The University Health Service

Better physical and mental health for the students at Chicago Circle is the goal of Health Service doctors, who are experienced clinicians; most of them have practiced for years as family physicians or as specialists.

Medical examinations are required of all students before their first registration. The examination is made by the family physician at the student's expense.

Beds for the temporary day care of ill students are provided. The University does not provide hospital care for its students, the large majority of whom are from families living in the Chicago area; hence, cases requiring bed care can be referred to the student's family doctor and to hospitals of the community.

The University provides clinic services for both preventive medicine and treatment. The cost of most medical expenses that cannot be assumed by the Health Service is covered by the student Hospital-Medical-Surgical Insurance, supervised by the Insurance Division of the Business Office, at a cost to the student of $6 per quarter.

Financial Aid

Scholarships of various types, grants, loans, and employment are the main areas of financial aid for undergraduates. Loans and employment are also available to graduate students. For additional information, see the Graduate Catalog. A student will receive an application for financial aid if he checks the box in Section 15 of the Application for Admission to the University.

Scholarships

Scholarships at the University of Illinois are limited in number and are awarded to the best qualified applicants. Each scholarship may have specific restrictions; nearly all require:

1. A superior scholastic record.
2. Evidence of financial need.

Financial need is evaluated from the completed Parents' Confidential Statement, to be filed with the College Scholarship Service by February 15. Forms and information can be obtained from high school counselors or from the College Scholarship Service, Box 881, Evanston, Illinois.

Most scholarships are awarded in late spring or early summer for the following school year. Incoming freshmen should apply for fall-quarter awards early in the senior year of high school. A student currently enrolled in the University of Illinois may file an application at any time if his scholastic average is 3.750 or higher.

University Scholarships. Most University of Illinois scholarships are restricted to Illinois residents, since the University is a state-supported institution. However, the University does have some scholarship funds for out-of-state students.

A few scholarship awards are made in cash, but for the most part scholarships exempt the recipient from the payment of tuition and, in certain cases, fees. Most annual scholarships are renewed if the student maintains the required scholastic average and continues to demonstrate financial need.

An entering freshman who is awarded a University scholarship must rank at least in the top quarter of his high school class and must demonstrate financial need. Past records indicate the average freshman scholarship winner ranked in the upper 10 percent of his high school class.

Military Scholarships. Any veteran who meets University admission requirements is scholastically qualified for a Military Scholarship. The Illinois Military Scholarship may be used concurrently with a United States government scholarship, a grant-in-aid, or an NDSL loan.

Students who are eligible for the Illinois State Military Scholarship are entitled to receive benefits from both the G. I. Bill and the scholarship. If your Military Scholarship has expired, however, you are *not* eligible to reapply for it. The following is a summary of the requirements for the Military Scholarship:

Residence Requirement

The applicant must have been a resident of the State at the time he entered active service or must have been a bona fide resident of the State until at least 6 months prior to entering active service and upon leaving the service must have returned to the State within 6 months and must have resided in the State for not less than one year immediately prior to the date on his application.

Length of Active Service

The applicant must have been on active duty for *not less than one year* unless he received an honorable discharge for medical reasons directly connected with such service.

Termination of Scholarship

An Illinois State Military Scholarship will automatically terminate four consecutive calendar years after the effective beginning date unless extension has been granted because of illness, the need to earn funds for schooling, or re-entry into active service.

Additional requirements are under consideration and may be imposed by the Illinois State Scholarship Commission.

Work Scholarships for Superior Students. Each year the Financial Aid Committee, under authority from the Board of Trustees, selects worthy students for the Work Scholarship Program. A Work Scholarship exempts the student from payment of tuition each quarter and requires an average of ten to twelve hours of work per week, which makes it possible for him to earn money for most of his other college expenses. Information about Work Scholarships may be obtained from the Office of the Director of Financial Aid.

Illinois State Grants. Under recent legislation passed by the General Assembly, the Illinois State Scholarship Commission administers a greatly expanded pro-

gram of grants to pay the cost of tuition and fees at all approved colleges and universities in the state.

A student who was not awarded an Illinois State scholarship, either honorary or monetary, may apply for a grant. Applicants entering college for the first time should apply through the high school counselor; prospective transfer students and junior college graduates secure forms from the financial aid office of the school they are currently attending.

Continuing students at the University of Illinois at Chicago Circle may secure Illinois State Grant application forms from the Financial Aid Office, Eighth Floor, University Hall, after December 1.

Students enrolled at Chicago Circle are reminded that if they wish to be considered for all types of funds available under financial aid, two separate and distinct financial statements must be filed: The University requires that a Parents' Confidential Statement be sent to the College Scholarship Service, Box 881, Evanston, Illinois; the Illinois State Scholarship Commission requires its own financial statement in addition to the foregoing. Forms are not interchangeable, although the same information is requested on both. The deadline for applications is February 15 for the following academic year (September through June).

Educational Opportunity Grants

The University of Illinois at Chicago Circle, in cooperation with the federal government, is administering the Educational Opportunity Grants authorized under the Higher Education Act of 1965.

The basic purpose of the Educational Opportunity Grant Program is to assist students who have exceptional financial need, and who, for lack of financial means of their own or of their family, would not be able to enter or to remain in college without such a grant.

An Educational Opportunity Grant may be awarded to the student who meets the following basic eligibility criteria:

1. He must be a citizen of the United States or must be in the United States permanently and must intend to become a citizen.
2. He must show evidence of academic or creative promise and must be capable of making satisfactory progress.
3. He must be accepted for enrollment or be enrolled in a full-time undergraduate course of study and must continue to be a full-time student while receiving the grant. Twelve hours per quarter is considered full-time.
4. He must be willing to accept an equal amount of financial aid, which will serve as the matching portion of the grant.

Applications for Educational Opportunity Grants should be made early in the senior year of high school. A student will receive an application for finan-

cial aid if he checks the box in Section 15A of the Application for Admission to the University. The grants will be awarded during the spring or summer to high school seniors who have been admitted for freshmen registration for the fall quarter, as well as to currently enrolled students who will be returning to college in September, provided they have not completed more than seven (7) semesters or eleven (11) quarters (or the equivalent) of college-level work. Continuing students are also eligible for these grants. Applications may be obtained from the Office of Financial Aid.

A student's eligibility and grant stipends are determined initially by the expected contributions from the income and assets of his parents. Therefore, it is *required* that all students who wish to be considered for an Educational Opportunity Grant submit a Parents' Confidential Statement. These forms may be obtained from high school counselors or from the Office of Financial Aid.

The matching portion of the grant can be provided from one or more of the following sources: University scholarships and grants, tuition waivers, approved loans and employment programs; State scholarships or grants; scholarships or grants offered by corporations or service organizations (Rotary, Elks, P.T.A.). It is understood that the University of Illinois will approve and/or award all matching aid.

Educational Opportunity Grants range from a maximum of $800 to a minimum of $200 per academic year. An Educational Opportunity Grant can be renewed for the period the student requires to complete his undergraduate study, but in no event can the grant exceed four academic years. A student will be eligible to renew his grant as long as he is making satisfactory progress as a full-time student and demonstrates continued financial need. If the student is in the upper half of his college class during the second year of the grant, an additional $200 may be awarded as an incentive.

Married students and students independent of parents meet additional qualifications. Consult the Financial Aid brochures for details.

For information about additional financial aid contact:

The Office of Financial Aid
808 University Hall
The University of Illinois at Chicago Circle
P.O. Box 4348
Chicago, Illinois 60680
Telephone: 663-3126

Loan Funds. Because the number of scholarships is limited and many worthy students are unable to qualify for those available, other forms of financial aid are also provided at the University of Illinois to assist the student in financing his college education.

The National Defense Education Act of 1958 and the Higher Education Act of 1965 make available federal funds for loans to superior students. Applicants must be United States nationals. This includes citizens and all persons

who are in the United States on a permanent-resident status. Borrowers are required to sign an oath of allegiance to the United States. In approving these loans, preference is given to applicants who express a desire to teach in elementary or secondary schools and to applicants whose academic background indicates a superior capacity or a preference for science, mathematics, engineering, or a modern foreign language. All applicants must present superior academic records; need for financial assistance must be shown. Students currently enrolled in the University of Illinois and progressing satisfactorily toward a degree may be eligible.

Loans are limited to $1,000 each year (July 1 to June 30), with a maximum of $5,000. The borrower must sign a promissory note. These federal loans carry 3 percent interest beginning nine consecutive months after the borrower ceases to be a full-time student, either by graduation or by withdrawal. A postponement of payments and a suspension of interest on the note, of not more than three years, may be arranged during the time the borrower is serving in the armed forces of the United States or in the Peace Corps. Those who teach full-time in public elementary or secondary schools may have as much as 50 percent of the debt cancelled at the rate of 10 percent for each year of teaching. Also, if a borrower teaches in a so-called hardship, or culturally deprived, area, he may have a loan cancelled at the rate of 15 percent per year to a maximum of 100 percent. In case of the death or permanent disability of the borrower, the loan and interest thereon may be cancelled.

University Loans

Both long-term and short-term loans are made to the student who can demonstrate need.

Long-Term University Loans are usually available to students who have completed, with a satisfactory record, a year or more at the University. The maximum loan that an individual may have outstanding at one time is $2,500.

Arrangements may be made to repay loans over a four-year period; payments begin four months after the student leaves school or otherwise ceases to be enrolled on a full-time basis. Security, in the form of a qualified endorser as a cosigner, or evidence of collateral satisfactory to the Business Office is required for all long-term loans unless otherwise provided in the deed or gift of the fund or by waiver in meritorious cases.

Illinois Guaranteed Loan Program. The Illinois General Assembly has authorized an Illinois loan program to guarantee student loans made by commercial lenders.

An applicant must be a citizen, a bona fide resident of the State of Illinois, a person of integrity, and enrolled in a full-time program (12 quarter hours minimum).

An eligible student who has been accepted for enrollment in college may borrow from a minimum of $300 to a maximum of $1,000 for freshmen and $1,500 for all other students, undergraduate and graduate. There is no age restriction; a minor is eligible to enter into a loan contract and to assume the responsibility for his own indebtedness. Repayment does not begin until the student either is graduated or ceases full-time study.

A list of the participating lending institutions is included with the application materials. Preferably, applicants should apply to a participating lending institution in or near his home community.

The maximum interest rate permitted by law is 6 percent simple interest which begins on the date of the loan. If the family's annual adjusted income is less than $15,000, the federal government pays all the interest while the student is in college and 3 percent during the repayment period. A student not qualified for a federal interest subsidy pays his own interest semiannually while he is in college.

Application forms and additional information about this program are available from participating lending institutions (banks, credit unions, and loan associations) in or near the student's home community or from the financial aid office of any college in the State of Illinois. Students who are out of the state at the time they wish to apply for a loan may request application materials from:

Illinois Guaranteed Loan Program
Box 33
Deerfield, Illinois 60015

Short-Term University Loans may be requested by new students as well as by those already on campus. Loan amounts range to $100 and must be repaid by the end of the quarter in which the loan is granted.

United Student Aid Funds Program. The University cooperates with banks throughout the nation to make student loans available under this program. Undergraduates may borrow up to $1,000 a year; graduate students up to $2,000 a year. A student may borrow a maximum of $4,000 for his undergraduate and graduate programs.

Repayment begins five months after a borrower ceases to be a full-time student. He has a maximum of four years to repay the loan in monthly installments.

Applications for these loans are initiated and processed in the Financial Aid Office and are then forwarded to the student's bank or to his parents' bank. Applications are accepted throughout the school year.

Emergency Aid (Small Loans). A student in good standing and in immediate need because of an emergency may apply for aid in amounts up to $15 by contacting the Dean of Men or the Dean of Women, who administer the Dean of

Men and the Dean of Women Emergency Aid and the Faculty Women's Club Emergency Fund.

The Director of Organizations and Activities

More than 70 recognized student organizations at Chicago Circle are assisted by this office in the conduct of their constitutional, financial, and social functions. Out-of-class activities and organizations are encouraged as a part of the broad education of the student, through which he may prepare himself for informed membership, including leadership, in community affairs.

The range of student organizations includes educational, preprofessional, political, religious, social-issue, arts, literary, and recreational groupings. Additional organizations will be formed with further development of the campus.

The Coordinator of Foreign Student Affairs

Foreign students are assisted in evaluating their abilities, planning their programs, and interpreting regulations applicable to them. This service includes assistance on problems of extension of stay, employment, border crossing, the details of maintaining legal status, housing, and understanding of the American way of life.

Placement Services

Seniors who are completing their undergraduate work and are intending to begin their careers may register at the Office of Student Employment for counseling and for planning and scheduling job interviews with the representatives of businesses, government agencies, and nonprofit organizations who visit the Chicago Circle campus in the fall and spring. The student should register shortly after classes begin in any quarter of the year to avail himself of the opportunities for interviews with representatives of firms from all over the United States. A junior may register shortly before the beginning of his senior year.

Special counseling is provided for the student whose major does not appear to conform to the current job market.

Admission to the University

As a state-supported, comprehensive university, the University of Illinois seeks to provide a higher education for those who will profit from an intellectually challenging program. The admission requirements are designed to identify those who possess the scholastic ability and maturity needed to succeed in and benefit from such an atmosphere.

A qualified applicant seeking admission as a full-time degree candidate may enter any college or division of the University of Illinois at Chicago Circle (with the exception of the College of Architecture and Art) at the beginning of the fall, winter, or spring quarters. Beginning-freshmen applicants for the College of Architecture and Art are admitted only at the beginning of the fall and spring quarters. Because of the excess of qualified applicants in the fall quarter, students whose first registration is in the summer quarter are not automatically eligible to continue in the fall quarter; they must apply separately for that quarter and meet quota specifications.

Dual, or Concurrent, Registration is not permitted without permission from the dean of the college in which the student is enrolled. Permission must be sought before such registration is undertaken.

Admission Requirements

A Beginning-Freshman applicant must meet two sets of requirements: the general University admission requirements and the requirements of the college or division he wishes to enter. See Requirements for Admission to Undergrad-

uate Study, page 49. General University requirements state that the applicant must:

1. Be at least 16 years of age.*
2. Be a graduate of an accredited high school.
3. Rank in the upper half of his class at graduation or qualify through a sufficiently high score on the American College Test (ACT). Non-residents of Illinois must rank in the top quarter of the high school class. See *Residence Classification.*
4. Present 15 units of credit, including those specified in Requirements for Admission to Undergraduate Study, page 49.

A unit represents one academic year of high school work that consists of 120 sixty-minute periods in the classroom. Two hours of work requiring little or no preparation outside the classroom are considered as having the same value as one hour of prepared classroom work. Fractional credits of less than ½ unit are not accepted. Less than 1 unit of work is not accepted in a foreign language, elementary algebra, plane geometry, physics, chemistry, or biology. The units that meet general University requirements and college or division requirements may be selected from the following groups:

A. *English.* A minimum of 3 units, including English 5 and 6 (junior year). Only courses in the history and appreciation of literature, composition (including oral composition when given as a part of a basic English course), and grammar count toward the 3 units required for admission to all curricula.

B. *Foreign Language.* The requirement for admission to a curriculum that requires a foreign language is fulfilled by 2 units in any one foreign language taken in an accredited high school. Alternatively, the language requirement for admission may be fulfilled by passing entrance examinations for 2 units in any one foreign language regularly taught in the University. Less than 1 unit is not accepted.

C. *Mathematics.* A minimum of 1 unit each in algebra and plane geometry is required for admission to all curricula; however, some require additional mathematics. General mathematics or other courses in mathematics may be accepted in lieu of algebra and plane geometry where the content of the course is essentially the same as that ordinarily included in algebra and plane geometry as determined by the Departments of Mathematics at the University of Illinois. (If such courses are not equivalent to the prescribed algebra and plane geometry courses or to more advanced courses, they will be accepted as miscellaneous credit.)

D. *Science.* Astronomy, biology (or botany and zoology), chemistry, geology, and physics are acceptable. General science will not be accepted as a unit of required science but will be counted as an elective in satisfying the required total of 15 units of acceptable credit.

E. *Social Studies.* Government, commercial or economic geography, economics, history, philosophy, psychology, and sociology are acceptable.

Credit for work completed prior to the ninth grade is accepted by the University if it appears on the transcript of an accredited high school and is certified by the principal to be for a course equivalent in quality and quantity to the course ordinarily offered in that high school. Such credit usually applies to elementary algebra and foreign language; however, it might apply to any subject.

A Transfer-Student applicant, one who, prior to applying for admission to Chicago Circle, has completed, with passing or failing grades, 18 or more quarter hours (or 12 or more semester hours) of University-level work, must

* A 15 year-old applicant who meets all other admission requirements may petition for admission.

meet all the requirements for beginning freshmen (except those for high school rank and test score) and must have achieved a minimum transfer grade-point average of 3.250. See **The Grading and Grade-Point Systems.**

Exception: A resident of Illinois whose average is 3.000 or above but is below 3.250 may petition for admission. His petition must be approved by the dean of the college he wishes to enter and by the Director of Admissions and Records. A nonresident of Illinois whose scholastic average is less than 3.250 will not be admitted. See *Residence Classification.*

Some of the Colleges have established higher requirements for admission and for continuation in certain curricula. See **Requirements for Admission to Undergraduate Study.** All transfer grades are used in computing the transfer student's average, including those earned in courses for which credit is not accepted on admission. A foreign student may qualify for admission consideration by presenting complete secondary and high school credentials that show superior scholastic accomplishment. In addition, foreign students who are from countries in which the native language is not English must pass an English language examination prescribed by the University of Illinois.

A Readmission Applicant, a former student of the University of Illinois who has previously attended any of the three campuses of the University as a regular student, will be considered for readmission on the basis of his status at the time he left the University, any college work he has completed elsewhere since his last attendance at the University, and the capacity at Chicago Circle.

A former student who left the University on academic drop status, regardless of whether he has attended another collegiate institution in the interval, must petition the dean of the college concerned when he applies for readmission.

A former student who left the University on clear status or on probation but has attended another collegiate institution from which he was dropped or where he has earned a scholastic average below 3.000 may be readmitted to the University only upon approval of his petition by the dean of the college concerned.

Scholastic probation at the University of Illinois may not be cleared by attendance at another institution except by special action of the dean of the student's college.

A petition for readmission by a former student dropped for disciplinary reasons must be acted upon by the Subcommittee of the Senate Committee on Student Discipline. Disciplinary probation at the University may not be cleared except by a specific action of the Subcommittee on Student Discipline.

Residence Classification of an applicant is determined on the basis of information given on his application and other credentials. Fees are assessed in

accordance with this decision. If the student believes he has a legitimate cause for change of status, he may, by a petition filed with the Office of Admissions and Records, request a change.

Requirements for Admission to Undergraduate Study

Colleges and Curricula	Minimum Scholastic Requirements		Subject Requirements Applicants who do not meet the requirements of a college and/or curriculum may be considered for admission if their high school record indicates superior ability.	Minimum Number of Units
	High School Rank	Transfer Average		
ARCHITECTURE AND ART				
Architecture[1] (All Programs)	Residents: Upper ½ or sufficiently high test scores. Nonresidents: Top ¼	3.250	English	3
			Algebra	2
			Plane Geometry	1
			Trigonometry	½
			One Foreign Language	2
			One or more units in each of the following for a total of	4
			Science (except General Science)	
			Social Studies	
Art (All Programs)			English	3
			Algebra	1
			Plane Geometry	1
			One Foreign Language	2
			One or more units in at least two of the following for a total of	5
			Foreign Language (in addition to the two required)	
			Mathematics (beyond Algebra and Plane Geometry)	
			Science (except General Science)	
			Social Studies	

[1] Applicants who meet the quantitative mathematics requirements but do not present specific units in advanced algebra and trigonometry may be considered to have met these requirements if they present other courses in mathematics which have algebra and plane geometry as prerequisites.

Colleges and Curricula	Minimum Scholastic Requirements		Subject Requirements	Minimum Number of Units
	High School Rank	Transfer Average		
BUSINESS ADMINISTRATION[1] (All Programs)	Residents: Upper ½ or sufficiently high test scores. Nonresidents: Top ¼	3.250	English Algebra Plane Geometry One Foreign Language Science (except General Science) Social Studies	3 2 1 2 2 2
EDUCATION Curriculum in Teacher Education (Elementary)	Residents: Upper ½ or sufficiently high test scores. Nonresidents: Top ¼	Under 90 hours: 3.300 90 hours or more: 3.500	English Algebra Plane Geometry One or more units in at least three of the following for a total of Foreign Language (at least two units in the same language) Mathematics (beyond Algebra and Plane Geometry) Science (except General Science) Social Studies	3 1 1 7

ENGINEERING (All Programs)	Residents: Upper ½ or sufficiently high test scores. Nonresidents: Top ¼	3.250	English 3 Algebra 2 Plane Geometry 1 Trigonometry ½ One Foreign Language* 2 One or more units in each of the following for a total of 4 Science (except General Science) Social Studies *Students deficient in foreign language may be admitted with the provision that the deficiency is removed during the first two years.
LIBERAL ARTS AND SCIENCES Curricula: Administration of Criminal Justice, General*, Home Economics[2], Medical Record Administration, Medical Technology, Prepharmacy. *For majors in this curriculum, see page 134.	Residents: Upper ½ or sufficiently high test scores. Nonresidents: Top ¼	3.250	English 3 Algebra 1 Plane Geometry 1 One Foreign Language 2 One or more units in at least two of the following for a total of 5 Foreign Language (in addition to the two required) Mathematics (beyond Algebra and Plane Geometry) Science (except General Science) Social Studies
Teacher Education (Secondary) Curricula: Biological Sciences, Chemistry, English, French, Geography, German, History, Mathematics, Physics, Political Science, Sociology, Spanish, Speech.		Under 90 hours: 3.300 90 hours or more: 3.500	

[1] Applicants who meet the quantitative mathematics requirement but do not present specific units in advanced algebra and trigonometry may be considered to have met these requirements if they present other courses in mathematics which have algebra and plane geometry as prerequisites.
[2] Limited program only.

Colleges and Curricula	Minimum Scholastic Requirements		Subject Requirements	Minimum Number of Units
	High School Rank	Transfer Average		
LIBERAL ARTS AND SCIENCES (Continued) Preprofessional Curricula: Dentistry Veterinary Medicine	Residents: Upper ½ Nonresidents: Top ¼	3.500	English Algebra Plane Geometry One Foreign Language One or more units in at least two of the following for a total of Foreign Language (in addition to the two required) Mathematics) beyond Algebra and Plane Geometry) Science (except General Science) Social Studies	3 1 1 2 5
Occupational Therapy[2, 3] Preprofessional Curriculum in Nursing		3.250		
Curriculum in Forestry[2]	Residents: Upper ½ or sufficiently high test scores. Nonresidents: Top ¼		English Algebra Plane Geometry One or more units in at least two of the following for a total of One additional unit in English One Foreign Language (at least two units in the same language) Mathematics (beyond Algebra and Plane Geometry) Science (except General Science) Social Studies	3 1 1 5
Curriculum in Chemistry[1]			English Algebra Plane Geometry Trigonometry One Foreign Language One or more units in each of the following for a total of Science (except General Science) Social Studies	3 2 1 ½ 2 4
Curriculum in Physics[1]	Residents: Upper ½ Nonresidents: Top ¼			

PHYSICAL EDUCATION				
Curricula			English	3
Physical Education for Men	Residents:	Under 90	Algebra	1
Physical Education for Women	Upper ½ or	hours:	Plane Geometry	1
	sufficiently	3.300	One or more units in at least three of the following for a total of	7
	high test		Foreign Language (at least two units in the same language)	
	scores.	90 hours	Mathematics (beyond Algebra and Plane Geometry)	
	Nonresidents:	or more:	Science (except General Science)	
	Top ¼	3.500	Social Studies	

[1] Applicants who meet the quantitative mathematics requirements but do not present specific units in advanced algebra and trigonometry may be considered to have met these requirements if they present other courses in mathematics which have algebra and plane geometry as prerequisites.

[2] Limited program only.

[3] Special Requirement: Recommendations from the University Health Service and the Director of the Occupational Therapy Curriculum.

[4] Special Requirement: Recommendation from the Director of the College of Physical Education.

Substitutions for and Exemptions from the Admission Requirements

Entrance Examinations

Students who do not meet the high school subject requirements, or who are not high school graduates, or who have been graduated from an unaccredited secondary school may satisfy these deficiencies by passing subject examinations specified by the University of Illinois.

General Educational Development Tests

Veterans, persons currently serving in the armed forces, and civilians 19 years or older who have not been graduated from high school and have not completed any college work may qualify for admission to certain curricula by passing the high school level General Educational Development Tests with satisfactory scores, provided credit from recognized sources is presented in required courses not covered by these tests.

Exception: Applicants under 19 years of age may take these tests in special cases if the Director of Admissions and Records approves.

A nonveteran who has not been graduated from high school, regardless of age, may take these tests at any time following the graduation of the class in which he would normally have been graduated. General Educational Development Tests in a single subject may be authorized to complete specific subject requirements for admission.

A person who has attended, but has not been graduated from, a recognized high school or a graduate of a recognized high school who does not meet the general University requirements may be admitted to the University on the basis of the General Educational Development Tests provided he has the necessary subjects required for admission to the curriculum he wishes to enter.

General Educational Development Tests cover the following areas: English, mathematics, social studies, and general science. Completion of the tests satisfies the requirements for English and social studies; it *does not* satisfy the algebra-geometry requirement or the science requirement. The General Educational Development Tests may substitute for high school graduation or for graduation from an unaccredited high school, and they may be used to establish rank for applicants who have not been graduated from high school.

Admission by Special Action

A student who is deficient in one or more of the admission requirements

may be admitted, with the approval of the Director of Admissions and Records and the dean of the college he wishes to enter, provided he submits evidence that clearly establishes his ability to do satisfactory work in the curriculum in which he wishes to enroll.

The 45-Hour Rule

The admission requirements covering high school graduation and specific high school subjects (except when those subjects are prerequisites for courses required for a degree at Chicago Circle) may be waived for those students in the two categories below who transfer to the University with 45 or more quarter hours of advanced standing and at least a 3.250 average in all work attempted.

1. Transfers to the University from fully accredited junior and/or senior colleges.

2. Transfers from one college to another within the University of Illinois.

All other requirements established for the admission of a transfer student to the curriculum of his choice must be met. Some curricula require a minimum scholastic average higher than 3.250. See **Requirements for Admission to Undergraduate Study.**

The Program of Progressive Admission

Past experience has shown that the number of qualified applicants who meet the minimum admission requirements exceeds the available facilities, particularly in the group applying for admission to the fall quarter. To utilize its capacities most effectively, the University of Illinois has instituted a program of progressive admission, under which admission priority is given to those students who demonstrate high scholastic ability. A combination of test score and rank in class forms the selection index for beginning freshmen. For transfer students and former University of Illinois students seeking readmission the cumulative average for previous collegiate work is the index. Under this program, admission is granted in the order of excellence to as many applicants as capacities allow.

For qualified applicants applying for beginning-freshman status, a single admission processing period was established for the fall quarter, 1968. On the scheduled notification date, qualified applicants for such status whose applications were complete by the stipulated deadline were sent notification of admission, deferment, or denial, as determined by their selection indices and by Chicago Circle capacities. Applications received after the deadline for receipt of completed applications were processed in the order of completion.

Qualified transfer students and readmission applicants are admitted in

order of scholastic excellence, as determined by their cumulative scholastic averages, and by spaces available in upperclass levels. Because of the numbers involved, structured admission-processing periods for the transfer group have not been scheduled.

Admission with Advanced Standing

Advanced standing consists of college-level credit acceptable to the University. The application of such credit toward a degree, however, is at the discretion of the dean of the college offering the degree.

Credit From Other Institutions

Fully Accredited Institutions. Work successfully completed in other fully accredited institutions (either those approved by one of the regional accrediting associations or those approved by one of the agencies recognized by the National Commission on Accrediting) is generally accepted by the University on an hour-for-hour basis, as shown on the official transcripts received from those institutions. For consistency, credit in semester hours is converted to credit in quarter hours.

Provisionally Accredited Institutions. Credit from institutions with provisional accreditation is accepted on a deferred basis until it is validated by satisfactory completion of additional work taken in residence at the University or in another fully accredited institution.

Unaccredited Institutions. Credit from unaccredited institutions is not accepted. However, credit in courses taken in such institutions may be established by proficiency examinations. See **Proficiency Examinations for Enrolled Students.**

Junior College Credit. The foregoing conditions governing acceptance of credit also apply to credit from junior college. Credit transferred from a junior college is limited only by the provision that a student, after attaining junior standing, must earn at least 90 quarter hours required for the degree at the University of Illinois or at any other approved four-year institution provided that the student meets the residence requirements for a degree from the University of Illinois. When a school or college requires three years of preprofessional college credit for admission, at least the last 45 quarter hours of preprofessional credit must be taken in an approved four-year collegiate institution.

Credit For Military Service

Completion of not less than six months of extended active duty in any branch of the armed forces of the United States entitles an applicant to six quarter hours of credit in physical education and six quarter hours in basic military science if the applicant has been honorably separated.

Credit is also allowed for those United States Armed Forces Institute (USAFI) courses for which the American Council on Education recommends credit at the baccalaureate level, provided the student has passed the appropriate USAFI end-of-course test or examination.

Credit for service schools successfully completed and for other courses taken while the student was in service may be allowed after evaluation by the Office of Admissions and Records.

No credit is allowed for the college-level General Educational Development Tests.

Credit From High School Mathematics Courses

The Departments of Mathematics of the University have approved the granting of credit at the college level for courses in college algebra and trigonometry offered by certain high schools if the student has earned a grade of C or higher in these courses. However, if credit in the courses is needed at the high school level to meet general University admission requirements, advanced standing is not granted.

Credit Through the Advanced Placement Program

This program, administered by the College Entrance Examination Board, is designed for those high school students about to enter college who wish to demonstrate their readiness for courses more advanced than those ordinarily studied during the freshman year. College credit is awarded to those students who earn sufficiently high grades on the examinations covering basic freshman-course subject matter. Many high schools offer advanced classes in one or more of the following subjects: English, French, German, Latin, Spanish, American history, European history, biology, chemistry, mathematics, and physics. The University encourages able high school students to enroll in these courses and to write the examinations in each of the foregoing subjects. The examinations are prepared by joint national committees of high school and college teachers and are administered by the Educational Testing Service. The examinations, graded by other national committees, have the following values: 5–high honors, 4–honors, 3–creditable, 2–pass, 1–fail.

The University of Illinois at Chicago Circle makes these specific credit recommendations:

Humanities

English

1. Grades of 5 and 4: 12 quarter hours of credit in English 101, 102, 103.
2. Grade of 3: Referred to the department.
3. Grade of 2: No credit.

French

1. Grades of 5, 4, and 3: 8 quarter hours of credit at the lower-division level.
2. Grade of 2: Referred to the department.

German

1. Grades of 5, 4, and 3: 8 quarter hours of credit at the lower-division level.
2. Grade of 2: Referred to the department.

Latin 4

1. Grades of 5, 4, and 3: 4 quarter hours of credit at the lower-division level.
2. Grade of 2: Referred to the department.

Latin 5

1. Grades of 5, 4, and 3: 8 quarter hours of credit at the lower-division level.
2. Grade of 2: Referred to the department.

Spanish

1. Grades of 5, 4, and 3: 8 quarter hours of credit at the lower-division level.
2. Grade of 2: Referred to the department.

Note: French, German, Latin and Spanish papers do not carry automatic credit in a particular foreign language course. Hence, the student, in consultation with the appropriate department may select the course for which he is best qualified. When such selection has been determined, credit, up to a maximum of 8 hours, will be granted in courses preparatory for that in which the student has been placed.

Social Studies

American History

1. Grades of 5 and 4: Credit for History 151, 152, 153. (12 quarter hours)
2. Grade of 3: Referred to the department.
3. Grade of 2: No credit.

European History

1. Grades of 5 and 4: Credit for History 111, 112, 113. (12 quarter hours)
2. Grade of 3: Referred to the department.
3. Grade of 2: No credit.

Natural Sciences and Mathematics

Biology

1. Grades of 5, 4, and 3: Credit for Biological Sciences 100, 101, 102. (12 quarter hours).
2. Grade of 2: No credit.

Chemistry

1. Grades of 5 and 4: Credit for three quarters of general chemistry (12 quarter hours) and permission to enroll in Chemistry 121.
2. Grade of 3: Credit for two quarters of general chemistry (8 quarter hours) and permission to enroll in Chemistry 114. Each student may take a proficiency examination in Chemistry 114 immediately after enrolling. If he passes, he is given credit in that course also and is permitted to register in the next chemistry course in sequence.

Mathematics

1. Grade of 5: Credit in Mathematics 130, 131, 132, 133 (20 quarter hours) and advanced placement in any course for which Mathematics 133 is a prerequisite.
2. Grade of 4: Credit in Mathematics 130, 131, 132, 133 (15 quarter hours) and advanced placement in Mathematics 133.
3. Grade of 3: Credit in Mathematics 130, 131 (10 quarter hours) and advanced placement in Mathematics 132.
4. Grade of 2: Students in this category are invited to take a proficiency examination in Mathematics 130. Passing of this examination will give 5 quarter hours of credit in Mathematics 130 and advanced placement in Mathematics 131.

Physics

1. Grades of 5 and 4: Credit in Physics 111 (4 quarter hours) or Physics 101 (5 quarter hours), depending on the student's curriculum.
2. Grade of 3: Automatic admission to a proficiency examination that covers Physics 111, 112, 113, and 114 or Physics 101, 102, and 103, depending on the student's curriculum. Grades of A or B on the proficiency examination on the first sequence carry 19 quarter hours of credit; on the second sequence, 15 quarter hours of credit. Grades of C: Consult the Department of Physics.
3. Grade of 2: With the approval of the Department of Physics, students may write a proficiency examination in any one of the courses in the sequences listed in paragraph 2. Credit will be allowed only for those courses in which the student has proficiency examination grades of C or higher.

Credit Earned Through the American College Test

Students whose American College Test subscore in English is 27 or higher will be given 4 hours of credit in Rhetoric 101. Those whose American College Test subscore in English is 25 or 26 may register for the honors sequence in Rhetoric 101 and 102. No comparable provisions exist for the other subscores on the ACT.

Credit Earned Through the Talented Student Program

Such credit is entered on the student's permanent University record. If he is admitted as a regular student after high school graduation, he is given advanced placement in those subjects in which he earned credit. See **Talented Student Program for Illinois High School Seniors.**

Admission Procedures

An undergraduate applicant falls into one of three major admission categories: beginning freshman, transfer student, or readmission applicant. The specific steps to be completed by the applicants in each category follow. Application blanks may be obtained by mail, telephone, or in person from the Office of Admissions and Records, University of Illinois at Chicago Circle, Box 4348, Chicago, Illinois 60680.

Beginning-Freshman Applicants. A student who has been graduated from high school but has not completed a sufficient number of credit hours to be classified as a transfer student[1] should submit the completed application to his high school principal with a request that it be mailed directly to the Office of Admissions and Records *together with* a final transcript of his high school record, including a statement of his scholastic rank when he was graduated.

A high school senior should submit the completed application to his high school principal with the request that it be mailed directly to the Office of Admissions and Records *together with* an official transcript of his high school record. The latter should include:

For the Student in the Final Semester of his Senior Year—grades for the first seven semesters, rank in class at the end of the seventh semester, and probable date of graduation.

For the Student in the Seventh Semester of his Senior Year—grades for the first three years, rank in class at the end of the sixth semester, courses in progress during the seventh semester, courses planned for the eighth semester (or a list of courses to be taken during the entire year, accompanied by a statement that they are all full-year courses), and the probable date of graduation.

Students in the foregoing categories must have their official scores in the tests administered by the American College Testing Program (ACT) sent to the Office of Admissions and Records. Information about where and when to take the ACT may be obtained from the high school counselor or by writing to ACT Registration Unit, P.O. Box 4505, Chicago, Illinois, 60680. If the applicant has completed this test but did not request that the scores be sent to the Office of Admissions and Records at Chicago Circle, he should send $1.00 (one dollar) to the Records Department, American College Testing Program, P.O. Box 451, Iowa City, Iowa, 52240, together with a request that a copy of the scores be mailed to the Office of Admissions and Records. An applicant who has not taken the ACT but has taken the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board should have his official scores sub-

[1]An applicant, who, as defined above, is a beginning freshman but has completed some college work must have a final transcript of that work forwarded to the Office of Admissions and Records. If he is currently enrolled at an accredited college or university at the time his application is submitted, he must request the institution he is attending to send to the Office of Admissions and Records a transcript indicating his courses in progress.

mitted to the same office; he may be considered for admission on the basis of those scores. If either the ACT or the SAT is taken more than once, the highest score reported is used to determine the scholastic index.

Applicants who wish to enter a fall quarter as beginning freshmen may submit applications and supporting credentials immediately after instruction begins for the fall quarter of the *preceding academic year.* For application submission dates for other quarters, see those given below for *Transfer Applicants.*

Transfer Applicants. If a transfer applicant, one who, prior to applying for admission to Chicago Circle, has completed, with passing or failing grades, 18 or more quarter hours (12 or more semester hours) of university-level work, is not presently enrolled in college, he should submit an application directly to the Office of Admissions and Records and request his high school principal and the registrar of each collegiate institution he has attended to send an official transcript to that office.

If the applicant is enrolled in college at the time he submits an application, he should comply with the directions above and also request that the transcript from the institution in which he is currently enrolled include a list of the courses he is taking. If his record is less than 3.500, final decision on his application will be delayed until he has completed work at the institution from which he plans to transfer.

Applications for admission to a specific quarter, with complete supporting credentials, should be submitted for consideration on or about these dates:

Fall quarter, March 1.
Winter quarter, October 10.
Spring quarter, January 15.
Summer quarter, April 1.

Readmission Applicants. If an applicant has previously attended one or more campuses of the University of Illinois, he must, in completing his application, indicate where he was last registered: Urbana, the Chicago Undergraduate Division (Navy Pier), Chicago Circle, the Medical Center. The Office of Admissions and Records will secure the student's previous University of Illinois records from the appropriate campus. However, an applicant who has attended any other college or university *since* his last registration on a campus of the University of Illinois must provide transcripts (as described above for transfer-student applicants) covering all work taken since he left the University of Illinois. The dates for submitting applications and credentials are the same as those for transfer applicants.

Note: A student whose *only* previous registration at the University of Illinois was in correspondence or extramural courses must present complete records of all other scholastic work, both high school and collegiate, as outlined above for new students, and must meet the admission requirements of his chosen college and curriculum if he is to be considered for admission. However, it will not be necessary to request transmission

of his University records in correspondence or extramural courses; they will be requested by the Office of Admissions and Records.

Selection of College and Curriculum

An applicant who is in doubt about the courses of study he should pursue may secure help in reaching a decision by attending the guidance program of the University. The Student Counseling Service offers educational and vocational aptitude examinations to second-semester high school seniors and to high school graduates. Appointments to take these examinations may be arranged through the Office of Admissions and Records. After he completes these examinations and submits his ACT scores, the applicant will receive an appointment for professional counseling.

Additional Records

If, in individual cases, records in addition to those listed for prospective beginning freshmen, transfer applicants, and readmission applicants are needed, the applicant will be notified by the Office of Admissions and Records. These may include an academic dean's recommendation, an Illinois residence clarification, approval for admission to specific programs, or other documents.

An applicant who has served on active duty in the armed forces of the United States *must* submit a photocopy of his service-separation papers.

Tuition-and-Fee Deposit

When the notice of eligibility for admission or readmission is mailed to an applicant, it is accompanied by a request for payment of a tuition-and-fee deposit of $30. The request for payment carries a deadline by which the deposit should be sent, and failure to make payment within the specified time will be construed as meaning the student no longer wishes to be considered for admission to that quarter. Money should *not* be mailed at the time the application is submitted.

Permit to Enter

After he pays his tuition-and-fee deposit, a student is sent either a Permit to Enter or an Approval of Readmission, as appropriate. These are statements of confirmation of reserved space in the college and curriculum he desires and a description of any advanced standing allowed him on admission or readmission. Also enclosed are the instructions he must follow to complete his registration.

Registration Procedures

Registration is the act of enrolling in an approved program of courses after the student has been granted a permit to enter and has completed:

1. Course placement examinations.
2. A medical examination.
3. Program advisement and approval.

Note: Concurrent Registration—In general, it is considered scholastically hazardous to enroll concurrently at both a campus of the University of Illinois and another accredited institution. A student contemplating such concurrent enrollment must get approval from the dean of his college before he so registers.

Until the student has completed all of the procedures noted below (where applicable), he is not fully registered in the quarter to which he has been admitted.

A Program consists of the courses and sections in which a student is currently registered. Registration is *not* complete until all fees have been paid or until arrangements have been made with the Business Office for the student to use the deferred-fee plan.

An enrolled student who is in good standing at the end of a given quarter does not file an application for admission to the ensuing quarter. If he wishes to enroll in the next session, he is advised to advance enroll at the appropriate time. This procedure is also in effect for students who successfully complete a spring quarter and expect to continue in the following fall quarter. However, a student may elect to attend any three consecutive quarters out of four; hence, if he chooses to use a quarter *other than the summer* as his vacation, or off quarter, he must file an application with the Office of Admissions and Records before the first day of instruction of the quarter he wishes to use as vacation. Application blanks for the purpose are available in that office.

The Medical Examination

All new students are required to take a medical examination prescribed by the University Health Service. This examination must be administered by the student's own physician at the student's expense. Instructions and the necessary forms are mailed with the Permit to Enter.

After the medical examination is completed and the forms are returned to the Health Service, the student will be sent a receipt, which he must bring to his advisement and registration conference.

The Placement Tests

Required of most students registering for the first time in the University of

Illinois, these tests determine course placement and are not taken until after an applicant has been approved for admission. Instructions about the tests are clearly stated in the material enclosed with the Permit to Enter. A new student must ascertain from these instructions whether he must take the placement tests in foreign language, mathematics, and chemistry, for all tests are not required of all students.

Academic Advising and Program-Request Conference

All new and former students who have been granted admission or readmission are scheduled for conferences at which they are advised by representatives of the several college offices. Subsequently, students are assigned to program-request conferences, during which they make final course and section selection and pay the balance due on tuition and fees.

Tuition and Fees

Tuition and some fees are assessed all students and are payable in full as part of registration. Under certain circumstances arrangements may be made with the Business Office to defer payment. The amount of the tuition and the service fee varies with number of credit hours for which the student registers. Tuition (but not the service fee) also varies according to the resident or nonresident of Illinois status of the student.

TUITION AND FEES—CHICAGO CIRCLE

PER QUARTER	*Full Program*		*Partial Program*			
	Range I		**Range II**		**Range III**	
	Above 10 quarter hours		Above 5 to 10 quarter hours		Above 0 to 5 quarter hours	
	Resident	Non-Resident*	Resident	Non-Resident*	Resident	Non-Resident*
Tuition (except those holding exemptions)	$57	$250	$40	$175	$25	$ 90
Service Fee	32	32	24	24	14	14
Hospital-Medical-Surgical Insurance Fee	6	6	6	6	6	6
Total	$95	$288	$70	$205	$45	$110

*See Residence Classification.

The Service Fee is used to cover the operating expense of Chicago Circle Center, the financing of the Center building, and the cost of the Student Activities Program.

The Course-Visitor Fee of $15 is assessed all class visitors who are not in Range I in the tuition-and-fee schedule. See *Visitors.*

The Special-Examination Fee of $10 is assessed for a special examination taken in the hope of obtaining credit in a course that has been failed at the University of Illinois. See *Student Handbook* (University of Illinois at Chicago Circle).

The Transcript Fee of $1 is assessed for each additional transcript sent after the first one. A student is issued one transcript of his record without charge.

The Late-Registration Fine of $15 is levied against all students who complete registration after classes have begun.

The Hospital-Medical-Surgical Insurance Fee is the same for all students, regardless of the number of hours for which they are enrolled or of their Illinois residence status. However, if a student presents evidence of insurance in force which provides him equivalent coverage, he may petition the University Insurance Office for a refund of this fee. Refunds are not made on any other basis. The student also must consult the Insurance Office about the time limit for such refund petition. If a student withdraws from the University, he does not receive a refund, since he remains insured for the balance of the quarter from which he withdrew. For the termination date, see the Policy certificate. Special provisions exist for students to be covered by this insurance during the summer months, irrespective of their registration for that part of the year, or for the months of an approved off-quarter vacation.

Deposits, Additional Fees, and Charges

One or more of the following deposits and additional fees and/or charges will be assessed where applicable.

The Lost-Photo-Identification-Card Fee is assessed for replacing a lost or destroyed identification card, initially issued to the student at the time of registration. The card is used to obtain library books, lockers, towels, and other equipment.

The Deferred-Fee Charge of $2 is imposed when arrangements have been made with the Business Office to defer payment of fees. The charge must be paid on the day the agreement is reached and is nonrefundable.

The Change-of-Program Fee of $1 is levied for each change-of-program

slip issued at the request of the student after classes have begun unless it is waived by the dean of the student's college.

Refunds

Students who withdraw from the University or from a course are, under certain circumstances, entitled to a refund of a portion of the tuition and fees paid. All requests for withdrawals should be submitted to the office of the college in which the student is enrolled.

Withdrawal From the University. The full amount of tuition and fees assessed, *except for the $30 nonrefundable service charge,* is refunded to students who withdraw *within the first ten days* of instruction of a quarter. After the tenth day of instruction and before the middle of the quarter, one-half of the amount assessed, *except for the $30 nonrefundable service charge,* is refunded.

No refund is issued after midquarter.

No refund is issued if the total assessment was less than $30 (for example, a student on a tuition-waiver scholarship).

Withdrawal From a Course: If such withdrawal results in a reduction in the student's program to a lower tuition-and-fee range, the full difference is refunded during the full-rebate period; half the amount of the difference is refunded when withdrawal occurs during the half-rebate period; no refund is made if withdrawal occurs thereafter.

Withdrawal by a Visitor: A full refund will be issued if the withdrawal is made *within ten days after payment of fees.* Thereafter, no refund will be made.

Withdrawal to Enter Military Service: If withdrawal occurs during the first six weeks of instruction, the student is entitled to a full refund of his tuition and fees, less the Hospital-Medical-Surgical Insurance fee.

If withdrawal occurs between the fifth and the eighth weeks of instruction, the student will receive one-half refund of his tuition and fees (less the Hospital-Medical-Surgical Insurance fee) and one-half credit for all courses in which he is earning a grade of C or better at the time of his withdrawal. For courses in which his grades were below C, grades of W (withdrawal without penalty) will be recorded.

No refund of tuition and fees is made after the eighth week, but full credit is allowed for all courses in which the student is earning grades of C or better, and W is recorded for courses in which he is receiving grades below C.

Note: Prior to the first day of instruction in a quarter, students who have advance enrolled and paid tuition and fees in full and wish to cancel their registration should so inform the Registration Division of the Office of Admissions and Records. These students are eligible for refunds in accordance with the regulations stipulated for withdrawals.

The College of Architecture and Art

Leonard J. Currie, M. Arch., Dean of the College
Alvin S. Boyarsky, M.R.P., Associate Dean
Rowland Rathbun, M.S., Assistant Dean

The College of Architecture and Art serves as a center for study and investigation in the visual and plastic arts and offers professional curricula in architecture and in several specialized areas. Emphasis is on the creative process within a broadly cultural educational program. Architecture and the arts are considered in their social context as a reflection of the highest aspirations of contemporary culture and as expressions that give meaning and purpose to human life. Principles and methodology are stressed rather than resultant form and changing styles.

All work submitted by students for credit in any course in any Department in the College of Architecture and Art belongs to The Board of Trustees of the University of Illinois, and the University reserves the right to retain, hold, copyright, use, exhibit, reproduce, and publish any work so submitted by any student for credit in any course.

The Department of Architecture

Professors

Donald D. Hanson, M.Arch., Head of the Department; Alvin S. Boyarsky, M.R.P.; Leonard J. Currie, M.Arch.; Edward L. Deam, M.Arch.; George A. Hinds, M.C.P.; Harold B. McEldowney, B.A. (Emeritus); Henry L. Mikolajczyk, M.Arch.; Frederick W. Wiesinger, Ph.D.

Associate Professors

Robert K. Adams, M.S.; Anthony J. DeFilipps, B.S.; Robert W. Gerstner, Ph.D.; Peter W. Gygax, Dipl. Arch.; Howard F. Koeper, M.A.; Rowland Rathbun, M.S.; Stanley Tigerman, M.Arch.

Assistant Professors

Rene Amon, M.S.; Michael S. Gelick, M.F.A.; Jon L. Liljequist, B.S., J.D.; Graeme M. Morland, A.R.I.B.A.; Hermann G. Pundt, M.A.; Roger G. Whitmer, M.S.; Robert T. Jaeger, M.Arch.

Lecturers

Kyle Benkert, M.Arch.; Jakob Blumer, Dipl. Arch.; Louis J. Colacco, Ph.D.; Martin D. Dubin, M.Arch.; Elliott Dudnik, M.S.C.E.; Maurice Gamze, B.S.M.E.; Charles Genther, B.S.; Peter Hockaday, B.Arch.; Edward Hoffman, B.S.C.E.; Hinman L. P. Kealy, M.C.P.; Philip A. Kupritz, M.Arch.; Carol LaBranche, M.A.; Robert G. Lukas, M.S.; James N. Montague, M.A.; Niklaus Morgenthaler, Werkbund S.W.B.; J. David Rasche, M.Arch.; Louis I. Rocah, M.S.; John Seidensticker, M.S.; Anthony Tadin, B.S.C.E.

The curriculum in architecture is structured to provide the student with the initial steps in the lifelong process of qualification required to fulfill the social responsibilities of the architect.

Architecture is the art and science of building to satisfy the environmental needs of man. Within those needs, it is the architect's responsibility to analyze the inherent social, psychological, and physical factors and to translate them creatively, through the act of design, into an appropriate physical environment. Thus, as society evolves, so too does the role of the architect. Today, society has charged architecture and its codiscipline, planning, with far greater social and physical responsibilities than ever before, responsibilities that are best exemplified by the term "urbanism." The results of poverty, social disor-

der, and an unaccommodating environment in a rural area are quite different in impact than are these same factors in an urban environment, where they foster social, moral, and economic decay and, eventually, total cultural disintegration.

Inherent in the architect's professional success is the potential of the "good life" for the majority of the world's population and the cultural growth and development of its societies. To achieve this potential, the historical evolution of architecture is presented to the student as a matrix for the social, structural, and aesthetic aspects of the profession. The successful student learns to think for himself, to solve problems, to avoid histrionics, and to see the world around him both as it is and as it could be. The factors implicit in architecture are numerous, weighted, variable, and interdependent. Hence, it is through a balanced, flexible sequence of courses in design, building technology, structures, and the humanities that the student is encouraged to identify and to place into context these many factors.

The first, or foundation, year is common for all students in the College; the second, third, and fourth years provide a common base for students in the Department of Architecture; the fifth year, during which the student completes his major and minor emphases, offers a maximum of flexibility for a degree program in one of the following:

Architectural Humanities	Design
Building Technology	Structures

The curriculum in architecture requires 239 quarter hours for graduation, exclusive of military training and required physical education. See page 49 for the admission requirements of the department. The candidate is then eligible for recommendation for the degree of Bachelor of Architecture in one of the above areas.

The Curriculum in Architecture

The courses offered in the fourth (summer) quarter are identical with those offered in the second (winter) quarter.

First Year

First Quarter	*Hours*
Architecture and Art 101–Basic Design I	3
Architecture and Art 111–Visual Communications I	2
Architecture and Art 141–Man and Environment	3
Mathematics 111*–Introduction to Analysis I	3–5
Rhetoric 101–Freshman Rhetoric and Composition	4
Physical Education	(1)
	15–17

*Required for all students who elect a design or humanities major. Structures and building technology majors must substitute Mathematics 130, 131, 132.

Second Quarter

Architecture and Art 102–Basic Design II	3
Architecture and Art 112–Visual Communications II	2
Architecture and Art 142–History of Architecture and the Arts I	3
Mathematics 112*–Introduction to Analysis II	3–5
Rhetoric 102–Freshman Composition and Rhetoric	4
Physical Education	(1)
	15–17

Third Quarter

Architecture and Art 103–Basic Design III	3
Architecture and Art 113–Visual Communications III	2
Architecture and Art 143–History of Architecture and the Arts II	3
Mathematics 194*–Introduction to Automatic Digital Computing	3–5
Sociology 100–Introduction to Sociology	4
Physical Education	(1)
	15–17

*Required for all students who elect a design or humanities major. Structures and building technology majors must substitute Mathematics 130, 131, 132.

Second Year

First Quarter — *Hours*

Architecture and Art 104–Basic Design IV	3
Architecture and Art 114–Visual Communications IV	2
Architecture 121–Statics and Strength of Materials I	3
Architecture and Art 144–History of Architecture and the Arts III	3
Physics 101–General Physics (Mechanics and Heat)	5
Physical Education	(1)
	16

Second Quarter

Architecture 101–Architectural Design I	6
Architecture 122–Statics and Strength of Materials II	3
Elective–from Architecture 231 through 238	3
Physics 102–General Physics (Electricity and Magnetism and Waves)	5
Physical Education	(1)
	17

Third Quarter

Architecture 102–Architectural Design II	6
Architecture 111–Building Technology I	4
Architecture 123–Statics and Strength of Materials III	3
Physics 103–General Physics (Modern Physics)	5
Physical Education	(1)
	18

Third Year

First Quarter — *Hours*

Architecture 201–Architectural Design III	6
Architecture 211–Building Technology II	4
Architecture 221–Structural Engineering I	3

Sociology 276–Sociology of Urban Life in Industrial Society	4
	17

Second Quarter

Architecture 212–Building Technology III	4
Architecture 222–Structural Engineering II	3
Art Elective(s) *	5
Elective (social science or humanities)	4
	16

Third Quarter

Architecture 202–Architectural Design IV	6
Architecture 213–Building Technology IV	4
Architecture 223–Structural Engineering III	3
Architecture 241–Urban and Regional Planning I	3
	16

*Structures and building technology majors must substitute Math. 195 for 3 hours of Art Electives.

Fourth Year

First Quarter — *Hours*

Architecture 203–Architectural Design V	6
Architecture 214–Building Technology V	4
Architecture 224–Structural Engineering IV	3
Architecture 242–Urban and Regional Planning II	3
	16

Second Quarter

Architecture 204–Architectural Design Problems	6
Architecture 215–Building Technology VI	4
Architecture 225–Structural Engineering V	3
Architecture Elective from 231 through 238	3
	16

Third Quarter

Architecture 226–Structural Engineering VI	3
Art Elective(s)	5
Architecture Elective from 231 through 238	3
Elective (social science or humanities)	4
	15

Fifth Year

The fifth year is elective except Architecture 343–Professional Practice. The student will take 6 hours in his elected major in the first and second quarters and will prepare a thesis in his third quarter.

First Quarter — *Hours*

Architecture 231 through 238[1], 301, 311, 312, 313, 321, 322, 323, 331, 332. These courses cover the major emphases; the student enrolls in those pertinent to his option for a total of	12
Elective (social science or humanities)	4
	16

Second Quarter

Architecture 231 through 238[1], 302, 314, 315, 316, 324, 325, 326, 332, 333. These courses cover the major emphases; the student enrolls in those pertinent to his option for a total of	12
Elective (social science or humanities)	4
	16

Third Quarter

Architecture 309 or 319 or 329 or 339—thesis in the student's option.	12
Architecture 343–Professional Practice	3
	15

Notes: For course descriptions, see **Courses of Instruction.**

General Education: A minimum of 9 hours in social science and 9 hours in the humanities are required of all degree candidates.

Courses in the College of Engineering can be substituted for equivalent structures courses in the College of Architecture if the student's adviser consents.

[1]For students in architectural humanities.

The Department of Art

Simon Steiner, M.S., Chairman of the Department

Professors

Roland Ginzel, M.F.A.; Richard Koppe; Alfred P. Maurice, M.A.; Robert Nickle, B.A.; John F. Richardson, M.A.; John Walley; John D. McNee, M.A.

Associate Professors

Leon Bellin, M.A.; Edward E. Burr, B.F.A. (Emeritus); Eugene Dana, M.Des.; Martin R. Hurtig, M.S.; Warren Sanderson, Ph.D.; Nancy Stableford, M.F.A.; Simon Steiner, M.S.

Assistant Professors

Nancy D. Berryman, Ed.D.; Donald Dimmitt, B.S.; Klindt B. Houlberg, M.A.; Jerald Jackard, M.A.; Robert A. Kostka, M.S.; Leon Levy, B.F.A.; Anne Markham, M.A.; Lawrence Salomon, M.A.; Stuart Schar, Ph.D., Executive Assistant to the Chairman; Tadao Takano, B.S.

Instructors

William S. Becker, M.F.A.; Wayne A. Boyer; David R. Edman, M.A.; Michael J. Elliston, B.S.; John Pacyna, M.F.A.; Herbert Slobin, B.S.; Robert W. Steigler, B.S.

Lecturers

Nathan Lerner, B.S.; Donald Yates, M.A.

The curricula of the Department of Art are formulated to release and develop the creative powers of the student while furthering his liberal education.

Students who major in the field of design or plastic and graphic arts are required to complete the two-year foundation program. In the third year, these students will select courses in their major. Students who major in art history are required to complete the first-year foundation program and the academic and history of art courses in the second-year foundation program. For all students, electives in the third and fourth year will be chosen from courses offered outside the Department of Art. The Art Department requires students to meet the University General Education requirement with courses in the

social sciences, natural sciences, and humanities, with each student being counseled into specific General Education courses.

Major areas of emphasis within the department are art history, design, and plastic and graphic arts. Within the area of design the student may specialize in communications design, industrial design, or photography-film. Within the area of plastic and graphic arts he may specialize in painting, sculpture, or printmaking. In either the area of design or of plastic and graphic arts the student has the further option of electing to follow a balanced program, which will give approximately equal emphasis in the three areas of specialization within the major field.

Each curriculum is designed to provide, through a wide range of offerings, a maximum of individual choice to permit flexible programs that the student may plan, with faculty counsel, to yield the highest degree of comprehensive skill and knowledge in the area of his choice.

For course descriptions, see **Courses of Instruction.**

The Curriculum in Art

Two-Year Foundation Program

First Year	*Hours*
Architecture and Art 101, 102, 103–Basic Design I, II, III	9
Architecture and Art 111, 112, 113–Visual Communications I, II, III	6
Architecture and Art 141–Man and Environment	3
Architecture and Art 142, 143–History of Architecture and the Arts I, II	6
Rhetoric 101, 102–Freshman Rhetoric and Composition	8
Electives (outside the College of Architecture and Art)	11–12
Physical Education	(3)
	43–44

Second Year	
Architecture and Art 104, 105, 106–Basic Design IV, V, VI	9
Architecture and Art 114, 115, 116–Visual Communications IV, V, VI	6
Architecture and Art 144–History of Architecture and the Arts III	3
Art History (elected from 200-level courses)	3
Electives (outside the College of Architecture and Art)	24
Physical Education	(3)
	45

Third and Fourth Years

During his third and fourth years the student will follow a program, developed with faculty counsel, which, with courses taken in his first and second year, will meet the overall credit requirements for the degree. For the degree of Bachelor of Arts, the following requirements for the several majors must be met.

Major in Art History

184 hours (exclusive of physical education and basic military science) distributed as follows:

27 hours in the following courses of the Architecture and Art foundation program:
A & A 101, 102, 103
A & A 111, 112, 113
A & A 141, 142, 143, 144

36 hours in art history courses

88 hours in general education courses (outside the College of Architecture and Art), including the required academic courses

33 hours of free electives

Major in Design

Communications Design or Industrial Design or Photography-Film.

189 hours (exclusive of physical education and basic military science) distributed as follows:

A. 45 hours in architecture and art courses of the two-year foundation program.

B. 50 hours in one of the three areas of design.

C. 28 hours in departmental courses outside the area selected for the 50 hours in B.

D. 66 hours in general education courses (outside the College of Architecture and Art) and in required foundation courses outside the area of architecture and art.

Balanced Program in Design (elected only with the approval of the Department of Art chairman). The same as the foregoing, with these changes:

B. 60 hours approximately equally distributed among courses in communications design, industrial design, and photography-film.

C. 18 hours in departmental courses other than those in design.

Major in Plastic and Graphic Arts

Painting or Printmaking or Sculpture.

189 hours (exclusive of physical education and basic military science) distributed as follows:

A. 45 hours in architecture and art courses of the two-year foundation program.

B. 60 hours in one of the three areas of plastic and graphic arts.

C. 18 hours in departmental courses outside of the area selected for the 60 hours in B.

D. 66 hours in general education courses (outside the College of Architecture and Art), including required foundation courses outside the area of architecture and art.

Balanced Program in Plastic and Graphic Arts (elected only with the approval of the Department of Art chairman). The same as the foregoing, with these changes:

B. 60 hours approximately equally distributed among courses in painting, printmaking, and sculpture.

C. 18 hours in departmental courses other than those in plastic and graphic arts.
The general education courses must include those that will fulfill the general University requirements in general education.

The College of Business Administration

Irvin L. Heckmann, Ph.D., Dean of the College
Oscar Miller, M.A., Assistant Dean
Patrick E. Rea, M.A., Administrative Assistant to the Dean

The degree program in the College of Business Administration is designed to provide students with a well-rounded education in preparation for careers in business administration and for careers that require training in economics. The curriculum includes courses in general education and in the various functional fields of business administration. It also allows a student to acquire skills in his chosen area of specialization.

The general education requirements provide a liberal education background and skills and tools that will enable the student to take full advantage of his academic experience. Thus, courses in mathematics, laboratory sciences, rhetoric and speech, social and behavioral sciences, and humanities enable the student to learn and to perform better throughout his lifetime. The business core courses provide basic knowledge about the different areas of business. Accounting, economics, finance, management, marketing, and quantitative methods constitute the business core curriculum.

Finally, the College offers courses that enable the student to acquire specialized training in the area of his choice and, when he graduates, provides a foundation on which to base further study by learning through experience or through additional academic training.

Professors

Raymond W. Coleman, Ph.D., Economics and Management; Lucile Derrick, Ph.D., Economics; Samuel Fox, J.D., Ph.D., Accounting; Robert W. French, Ph.D., Economics and Management; Clarence H. Gillett, Ph.D., Management; William D. Grampp, Ph.D., Economics; Irvin L. Heckmann, Ph.D., Management; Leonard Kent, Ph.D., Economics; Alfonse T. Malinosky, M.B.A., C.P.A., Accounting; William H. Reynolds, Ph.D., Marketing; Albert J. Schneider, M.B.A., C.P.A., Accounting; Sherman Shapiro, Ph.D., Economics; William W. Tongue, Ph.D., Economics and Finance.

Associate Professors

Hale C. Bartlett, Ph.D., Management; Bernard H. Baum, Ph.D., Management and Sociology; William J. Dunne, M.B.A., Management; S. George Huneryager, Ph.D., Management; S. Madonna Kabbes, M.B.A., C.P.A., Accounting (Emerita); Carl M. Larson, M.B.A., Marketing; Oscar Miller, M.A., Economics; Samuel Reid, Ph.D., Finance; Fayette B. Shaw, Ph.D., Finance.

Assistant Professors

Bert E. Elwert, Ph.D., Economics and Management; Laurence Feldman, Ph.D., Marketing; Winifred B. Geldard, M.B.A., C.P.A., Economics (Emerita); Reuven Hendler, Ph.D., Economics; Thomas M. Johnson, J.D., Ph.D., Finance and Economics; Vernon T. S. Kam, M.B.A., Accounting; Edward C. Knudson, M.B.A., Economics (Emeritus); Mildred Levy, Ph.D., Economics; F. John Mathis, Ph.D., Economics; Ronald P. Moses, M.B.A., Economics; James F. Niss, PhD., Economics; J. Randolph Norsworthy, Ph.D., Economics; Edward T. Ossman, M.B.A., C.P.A., Accounting; Arthur O. Seltzer, M.A., Economics; Keshava Sen, Ph.D., Economics (Visiting); Allen L. Sinai, M.A., Economics; Frederick Stubbs, Ph.D., Finance; William L. Talbert, M.B.A., C.P.A., Accounting; Azriel Teller, Ph.D., Economics; David Tuerck, Ph.D., Economics.

Instructors

Mary Lou Larmore, Ph.D., Economics; Josephine Margraff, M.B.A., Accounting; Kenneth Shay, B.A., Economics.

Lecturers

Harold W. Jacobsen, J.D., Business Law; Patrick E. Rea, M.A., Management; Schlomo Shalit, M.B.A., Economics; Alvin D. Star, M.B.A., Marketing; Fred Travis, M.A., Management.

Graduation Requirements

A minimum of 186 quarter hours, exclusive of the required hours of physical education, are required for the degree of Bachelor of Science in Business Administration, distributed as follows:

	Hours
General education	96
Business core curriculum	66
Area of specialization and electives	24
	186

Summary of Graduation Requirements

General Education Requirement[1]

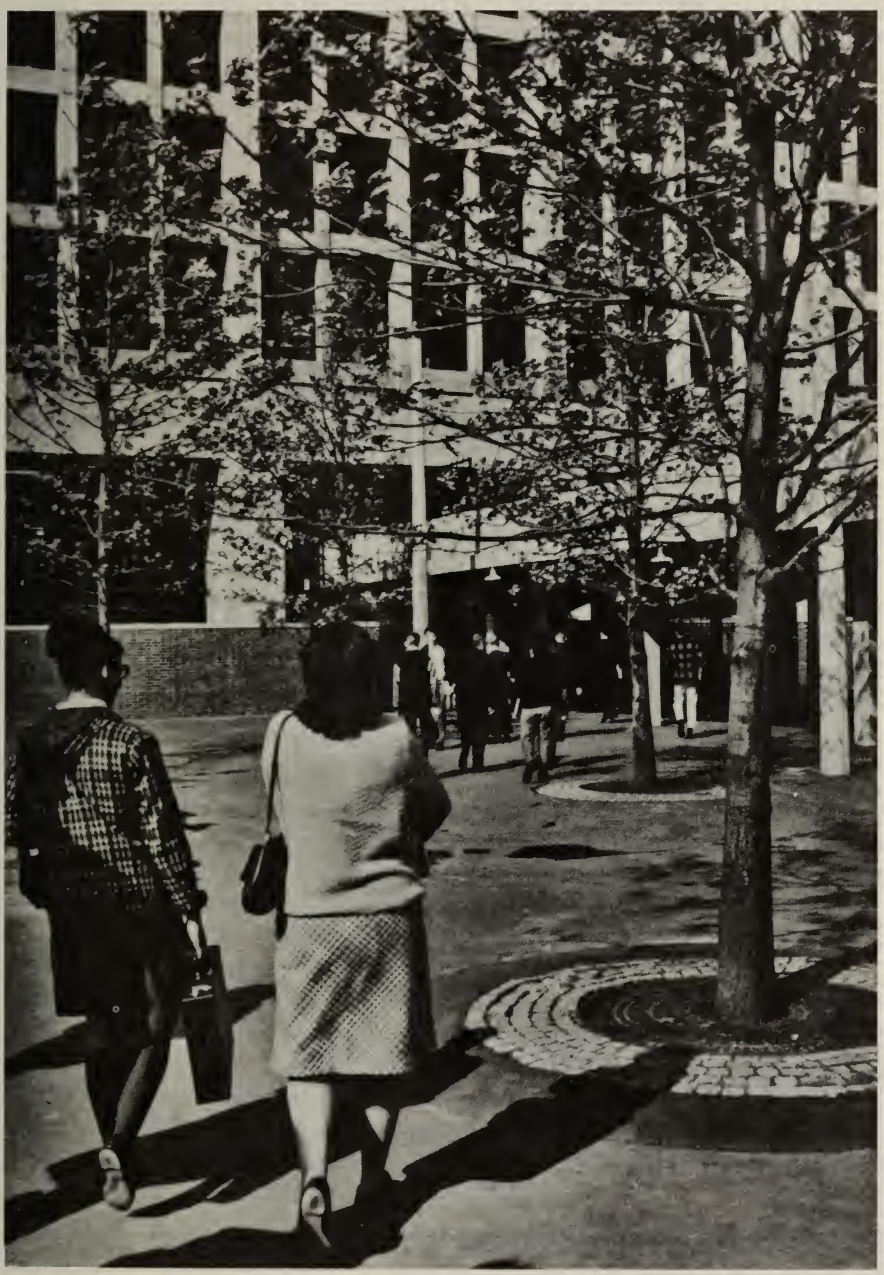
	Hours
Rhetoric 101, 102–Freshman Rhetoric and Composition	8
Rhetoric 251–Business Communication	4
Speech 101–Principles of Effective Speaking	5
Mathematics 110, 111, 112[2]–Finite Mathematics and Introduction to Analysis I, II	11
Laboratory Science Sequence*	12
Economics 120, 121–Principles of Economics I, II	8
Philosophy 102–Elementary Logic	4
Social Science:	
Behavioral (anthropology, psychology, or sociology)	8
Economics 120, 121–Principles of Economics I, II	8
History and/or political science	8
Fine arts	3
General education electives*	13
	96

Business Core Requirements

	Hours
Management 150, 151–Business and Society I, II	8
Accounting 100, 101, 102–Accounting I, II, III	9
Economics 320–Macroeconomic Theory	4
Economics 321–Microeconomic Theory	4
Economics 322–Managerial Economics; OR	
Economics 323–Business Conditions Analysis	4
Quantitative Methods 170, 171, 172–Statistics I, II, III	9
Finance 340–Money and Banking	4
Finance 341–Business Finance	4
Marketing 360–Principles of Marketing	4

[1]6 quarter hours of physical education are required in addition to the 186 hours.
[2]This sequence is for the student who enters the college with credit in college algebra. If he does not have such credit, he takes the Mathematics Placement Test before he registers in the College. His score determines whether he enrolls in Mathematics 100 or 104, neither of which carries credit.
*Refer to page 81 for approved sequences in the humanities, natural sciences, and the fine arts.

Management 350–Organization and Administration	4
Management 351–Organization Theory	4
Management 359–Business Policy	4
Business Law 310–Managerial Jurisprudence	4
	66



A Typical Program in the College of Business Administration

Freshman Year

First Quarter	*Hours*
Management 150	4
Mathematics 110*	5
Rhetoric 101	4
Science (Laboratory)	4
Physical education	1
	18
Second Quarter	
Management 151	4
Mathematics 111	3
Rhetoric 102	4
Science (Laboratory)	4
Physical education	1
	16
Third Quarter	
Speech 101	5
Mathematics 112	3
Philosophy 102	4
Science (Laboratory)	4
Physical education	1
	17

Sophomore Year

First Quarter	*Hours*
Accounting 100	3
Economics 120	4
Quantitative Methods 170	3
Rhetoric 251	4
Physical education	1
	15
Second Quarter	
Accounting 101	3
Economics 121	4
Quantitative Methods 171	3
Behavioral science or history or political science	4
Physical education	1
	15
Third Quarter	
Accounting 102	3
Finance 340	4
Quantitative Methods 172	3
Behavioral science or history or political science	4
Physical education	1
	15

Junior Year

First Quarter	*Hours*
Economics 320	4
Management 350	4
Marketing 360	4
Behavioral science or history or political science	4
	16
Second Quarter	
Economics 321	4
Finance 341	4
Management 351	4
Behavioral science or history or political science	4
	16
Third Quarter	
Economics 322 or 323	4
Fine arts	3
Area of concentration or elective	4
General education elective	4
	15

Senior Year

First Quarter	*Hours*
Business Law 310	4
Humanities	4
General education elective	5
Area of concentration or elective	4
	17
Second Quarter	
Humanities	4
General education elective	4
Area of concentration or elective	8
	16
Third Quarter	
Management 359	4
Humanities	4
Area of concentration or elective	8
	16

***Freshmen should register for Mathematics 110 only if the placement test so indicates. Otherwise, registration is in the mathematics course indicated by the placement test.**

The typical program for freshman and sophomores is common to all areas in the College of Business Administration except Quantitative Methods.

Approved Sequences in the Humanities, Natural Sciences, and Fine Arts

Humanities

English
101, 102, 103
121, 122, 123
150, 151, 152

Humanities
101, 102, 103
106, 107, 108
151, 152, 153

French
201, 202, 203*

German
3 courses in literature, 200-level or above, one of which may be in translation.

Spanish
240, 241, 242*
221, 222, 223*

French 216, German 216, Spanish 240 or 241

Music
130, 131, 132, 200

Philosophy
201, 203, and one additional course

Speech
121, 122, 123

Natural Sciences (Laboratory)

Biological Sciences
100, 101, 102

Chemistry
112, 113, 114

Geography
101, 102, 103

Geology
101, 102, 103

Physical Sciences
101, 102, 103

Physics
101, 102, 103

Fine Arts

Recommended:

Architecture
241

Architecture and Art
141 or 142

Art
115

Music
130 or 131 or 132

Speech and Theatre
121 or 329

Also acceptable: a minimum of 3 hours in courses in architecture, architecture and art, art history, music.

Note: See **Courses of Instruction** for course descriptions and prerequisites.

Areas of Specialization

Accounting

Accounting is concerned with (1) the measurement of income and wealth derived from economic enterprise and (2) the communication of information about the financial condition of and the results of activities of economic organizations. The specific functions include management control, tax management, and the attest function.

*These 9-hour or 10-hour sequences are the only exception to the general requirement of 12-hour course sequences. The additional hours must be made up in general education courses.

Requirements: 12 hours
Accounting 301–Asset Valuation and Income Determination, 4 hours
Accounting 302–Accounting for Entity Interest, 4 hours
Accounting 300–Managerial Cost Accounting, 4 hours
Plus two of the following: 8 hours
Accounting 303–Auditing, 4 hours
Accounting 304–Federal Income Tax, 4 hours
Accounting 305–Planning and Control, 4 hours
Accounting 306–Readings and Advanced Problems, 4 hours
Plus one of the following: 4 hours
Quantitative Methods 375–Information Systems I, 4 hours
Quantitative Methods 376–Information Systems II, 4 hours
Quantitative Methods 370–Multivariate Analysis, 4 hours
Mathematics 194–Introduction to Automatic Digital Computing, 4 hours
Economics 335–Econometrics, 4 hours

Suggested Course Schedule for Accounting Majors

Junior Year

First Quarter	Hours
Accounting 301	4
Economics 320	4
Marketing 360	4
Management 350	4
	16
Second Quarter	
Accounting 302	4
Economics 321	4
Finance 341	4
Management 351	4
	16
Third Quarter	
Accounting 300	4
Economics 322 or 323	4
Behavioral science[2] or history or political science	4
Fine arts	3
General education elective[4]	
Mathematics 194	3
	18

Senior Year

First Quarter	*Hours*
Accounting 303[1]	4
Behavioral science[2] or history or political science	4
General education elective	5
Humanities	4
	17
Second Quarter	
Quantitative Methods 375[3]	4
Business Law 310	4
Accounting[1] or business elective[3]	4
Humanities	4
	16
Third Quarter	
Accounting 304[2]	4
Management 359	4
General education elective	4
Humanities	4
	16

[1]Students may elect any two of these: Accounting 303, 304, 305, 306.
[2]Eight hours behavioral sciences and eight hours history and/or political science required of all students.
[3]Students may elect any one of these: Quantitative Methods 375, 376, 370, Mathematics 194, Economics 335.
[4]It is recommended that Mathematics 194 be taken in preparation for Quantitative Methods 375. Mathematics 194 may be counted as a general education elective.

Recommended Program in Preparation for the CPA Examination

Students who wish to prepare for the CPA Examination should consider the following:

The legal requirements for the CPA Examination in Illinois are at least 180 quarter hours (120 semester hours) of college credit, including at least 41 quarter hours (27 semester hours) of accounting and business law.

The following courses have been approved by the Committee on Accountancy and by the Board of Examiners in Accountancy as satisfying this requirement.

	Quarter Hours
Accounting 100, 101, 102	9
Accounting 300, 301, 302	12
Accounting 303, 304, 305, 306 (any 3)	12
Quantitative Methods 375	4
Business Law 310	4
	41

To meet this requirement it is necessary to take one additional course (4 hours) in accounting beyond the minimum required to meet graduation requirements. The additional course may be one of the following: Accounting 303, 304, 305 or 306

Students who plan to sit for the CPA Examination should also take a CPA review course after graduation.

Economics

Economics deals with determinants of the general level of employment, production, and income and the principles of allocating resources to maximize benefits to the public. It provides essential background for applications in business administration and social sciences.

Requirements:

Four courses from the designated areas with at least one from each area for a total of 16 hours.

Area I

Economics 324–Economic History of the United States, 4 hours
Economics 325–Economic History of Europe, 4 hours
Economics 326–History of Economic Thought, 4 hours

Area II

Economics 327–Comparative Economic Systems, 4 hours
Economics 328–Government Finance, 4 hours
Economics 329–Industrial Organization, 4 hours
Economics 330—Government and Business, 4 hours
Economics 331–Labor Economics, 4 hours
Economics 332–Urban Economics, 4 hours
Economics 398–Independent Study in Economics*

Economics 399–Special Topics in Economics*

Area III
Economics 322–Managerial Economics, 4 hours, or
Economics 323–Business Conditions Analysis, 4 hours**
Economics 333–International Economics, 4 hours
Economics 334–Economic Development, 4 hours
Economics 335–Econometrics, 4 hours
Free electives, 8 hours

Suggested Course Schedule for Economics Majors

Junior Year		**Senior Year**	
First Quarter	*Hours*	*First Quarter*	*Hours*
Economics 320	4	Business Law 310	4
Management 350	4	Humanities	4
Marketing 360	4	General education elective	5
Behavioral science or history or political science	4	300-level economics course	4
	16		17
Second Quarter		*Second Quarter*	
Economics 321	4	Humanities	4
Finance 341	4	General education elective	4
Management 351	4	300-level economics course	4
Behavioral science or history or political science	4	Free elective	4
	16		16
Third Quarter		*Third Quarter*	
Economics 322 or 323	4	Management 359	4
Fine arts	3	Humanities	4
300-level economics course	4	300-level economics course	4
General education elective	4	Free elective	4
	15		16

*Hours credit depend on arrangement with instructor.
**Whichever is not elected to satisfy the core requirement.

Finance

The finance curriculum explores the influence of the monetary and banking system on the general business level, the principles of financial analysis and control as applied to individual business firms, and economic and financial factors bearing on the valuation and selection of securities.

Requirements:

Finance 342–Investments, 4 hours
Finance 343–Risk and Insurance, 4 hours
Finance 344–Investment Policy, 4 hours
Finance 345–Problems in Business Finance, 4 hours — 16 hours
Free electives — 8 hours

Suggested Course Schedule for Finance Majors

Junior Year

First Quarter	*Hours*
Economics 320	4
General education elective	4
Management 350	4
Behavioral science or history or political science	4
	16
Second Quarter	
Economics 321	4
Marketing 360	4
Management 351	4
Behavioral science or history or political science	4
	16
Third Quarter	
Accounting 301	4
Finance 341	4
Fine arts	3
Finance 343	4
	15

Senior Year

First Quarter	*Hours*
Business law	4
Humanities	4
Finance 342	4
General education elective	5
	17
Second Quarter	
Finance 344	4
Humanities	4
Finance 345	4
Economics 323*	4
	16
Third Quarter	
Management 359	4
Humanities	4
General education elective	4
Economics 322*	4
	16

Management

The management degree program provides students with a theoretical and practical preparation for assuming responsible managerial and executive positions in a variety of working organizations. All specialized options within the management area emphasize analytical preparation for effective decision-making and broadening preparation for leadership positions.

Requirements:

1. Management 352–Administrative Practices — 4 hours
2. Two courses from the following fields: — 8 hours

Operations and Systems Management

This option provides the student with a sound background in the management sciences and the production function common to all work organizations. Emphasis is upon computer applications, management information systems, and materials management.

*Recommended.

For specialists in operations and systems management:
Management 356—Operations and Systems Management I, 4 hours.
Management 357–Operations and Systems Management II, 4 hours.

Personnel and Industrial Relations

Personnel and industrial relations is concerned with the effective utilization of human resources within work organizations. Emphasis is on the behavior of people at work and the staff programs available to managers for more effectively utilizing people at work and coping with human problems. Union–management relations are also explored.

For specialists in personnel and industrial relations:
Management 353—Personnel Management, 4 hours
Management 354—Industrial Relations Systems, 4 hours

General Administration

The emphasis of general administration is on acquainting students with the many and varied aspects of the manager's role in complex working organizations. Stress is placed upon the internal dynamics of complex work organizations, the structural components, and the many personal and interpersonal problems of the manager.

For general-administration background students: a combination of the above options with the consent of the adviser.

3. Three courses from the following areas: 12 hours
   A. Economics 322–Managerial Economics, 4 hours or
      Economics 323–Business Conditions Analysis, 4 hours
      (whichever is not taken in the core)
   B. One course from an approved 300-level business core
   C. One course from an approved 200-level or 300-level course outside of business

Suggested Course Schedule for Management Majors

Junior Year

First Quarter	*Hours*
Economics 320	4
Management 350	4
Marketing 360	4
Behavioral science or history or political science	4
	16
Second Quarter	
Economics 321	4
Finance 341	4
Management 351	4
Behavioral science or history or political science	4
	16
Third Quarter	
Economics 322 or 323	4
Fine arts	3
Management 352	4
General education elective	4
	15

Senior Year

First Quarter	*Hours*
Business Law 310	4
Humanities	4
General education elective	5
Major subject	4
	17
Second Quarter	
Humanities	4
General education elective	4
Major subject	8
	16
Third Quarter	
Management 359	4
Humanities	4
Major subject	8
	16

Marketing

Modern marketing management involves the integration of materials from diverse disciplines. Psychology, sociology, and other behavioral sciences contribute to a better understanding of consumer behavior, and quantitative methods are increasingly used in the analysis of marketing information.

Requirements:	*Hours*
Marketing 361–Consumer Market Behavior, 4 hours	
Marketing 362–Marketing Research, 4 hours	
Marketing 363–Marketing Organization, 4 hours	
Marketing 364–Managing Marketing Communications, 4 hours	
Marketing 365–Marketing Management, 4 hours	20 hours
Free elective (with approval of Marketing Department)	4 hours

Suggested Course Schedule for Marketing Majors

Junior Year

First Quarter	*Hours*
Marketing 360	4
Economics 320	4
Management 350	4
Behavioral science or history or political science	4
	16
Second Quarter	
Marketing 361	4
Economics 321	4
Management 351	4
Finance 341	4
	16
Third Quarter	
Marketing 362	4
Economics 322 or 323	4
Behavioral science or history or political science	4
Fine arts	3
	15

Senior Year

First Quarter	*Hours*
Marketing 363	4
Business Law 310	4
Humanities	4
General education elective	5
	17
Second Quarter	
Marketing 364	4
Humanities	4
General education elective	8
	16
Third Quarter	
Marketing 365	4
Management 359	4
Humanities	4
Elective chosen by the Marketing Department	4
	16

Quantitative Methods

Quantitative methods presents to the student the concepts and approaches available to him for dealing with problems under conditions of uncertainty.

Uses of the computer in solving problems are also stressed.

Requirements	*Total*
Quantitative Methods 370–Multivariate Analysis, 4 hours	
Quantitative Methods 371–Survey Research, 4 hours	
Quantitative Methods 375–Information Systems I, 4 hours	
Quantitative Methods 376–Information Systems II, 4 hours	
Mathematics 348–Linear Transformations and Matrices, 5 hours	
Mathematics 375–Probability II, 3 hours	24 hours

Suggested Course Schedule for Quantitative Methods Majors

Freshman Year

First Quarter	*Hours*
Management 150	4
Mathematics 110	5
Rhetoric 101	4
Science (laboratory)	4
Physical education	1
	18
Second Quarter	
Management 151	4
Mathematics 132	5
Rhetoric 102	4
Science (laboratory)	4
Physical education	1
	18
Third Quarter	
Mathematics 195[1]	3
Mathematics 133	5
Philosophy 102	4
Science (laboratory)	4
Physical education	1
	17

Sophomore Year

First Quarter	*Hours*
Accounting 100	3
Economics 120	4
Quantitative Methods 170	3
Rhetoric 251	4
Physical education	1
	15
Second Quarter	
Accounting 101	3
Economics 121	4
Quantitative Methods 171	3
Speech 101	5
Physical education	1
	16
Third Quarter	
Accounting 102	3
Finance 340	4
Quantitative Methods 172	3
Behavioral science	4
Physical education	1
	15

Junior Year

First Quarter	*Hours*
Economics 320	4
Fine arts	3
Management 350	4
Mathematics 370[1]	3
Quantitative Methods 370	4
	18

Senior Year

First Quarter	
Humanities	4
Mathematics 348	5
Quantitative Methods 376	4
Elective[2]	3
	16

[1]It is recommended that Mathematics 195 be taken in preparation for Quantitative Methods 375; Mathematics 370, in preparation for Mathematics 375.

Second Quarter

Economics 321	4
Mathematics 375	3
Management 351	4
Quantitative Methods 371	4
Elective[2]	3
	18

Third Quarter

Economics 322 or 323	4
Finance 341	4
Quantitative Methods 375	4
Behavioral science	4
	16

Second Quarter

Business Law 310	4
History or political science	4
Humanities	4
Marketing 360	4
	16

Third Quarter

Humanities	4
History or political science	4
Management 359	4
Elective[2]	3
	15

General Education Course Sequences for Transfer Students

Transfer Students Entering With	*Additional Requirements**
6 semester hours of humanities survey	Any course in any field of the humanities
6 other hours of humanities in sequence	
6 semester hours of biology	Any one of BioS. 100, 101, 102
6 semester hours of physical science with laboratory	One laboratory course in physical science
3 or 4 semester hours of biology	Any two of BioS. 100, 101, 102
3 or 4 semester hours of physical science survey	Two courses in physical science
3 semester hours of humanities survey	Two courses in sequence in humanities

*To fulfill a sequence requirement, a student must satisfactorily complete a course (or courses) or equivalent for which he has no previous credit.

[2]The following are five sequences from which it is recommended quantitative methods majors elect one (9 hours):

1. Mathematics 290–Introduction to the Theory of Digital Machines
   395–Advanced Programming
   397–Mathematical Theory of Data Processing
2. Mathematics 310–Higher Analysis I
   311–Higher Analysis II
   312–Higher Analysis III
3. Mathematics 321–Elementary Differential Equations II
   322–Elementary Partial Differential Equations I
   323–Elementary Partial Differential Equations II
4. Mathematics 340–Modern Higher Algebra I
   341–Modern Higher Algebra II
   342–Modern Higher Algebra III
5. Economics 335–Econometrics sequences
   At least 5 hours from sequences
   1, 2, 3, or 4 above.

The prerequisites and electives listed in the Suggested Schedule for Quantitative Methods Majors may be used in fulfilling the general education requirements.

The College of Education

David C. Epperson, Ph.D., Dean of the College
Robert M. Crane, Ed.D., Associate Director
Joseph J. Malinchoc, Ed.D., Director of Student Teaching
Roland Swaim, Ed.D., Director of Educational Placement

Professors

David C. Epperson, Ph.D.; Victor E. Ricks, Ph.D.; Van Cleve Morris, Ed.D.;

Associate Professors

Jean H. Baer, Ph.D.; Patricia S. Charlier, Ph.D.; Robert M. Crane, Ed.D.; Eliezer Krumbein, Ph.D.; Joseph J. Malinchoc, Ed.D.; Betty E. Orr, Ph.D.; Elizabeth Porch, Ed.D.; Madelaine T. Shalabi, Ph.D.

Assistant Professors

Gerald Danzer, Ph.D.; George Giles, Ph.D.; Faustine Jones, Ed.D.; Julius Menacker, Ed.D.; George Monroe, Ph.D.; Robert H. Ratcliffe, Ph.D.; Roland Swaim, Ed.D.; Harriet Talmage, Ph.D.; Charles A. Tesconi, Ed.D.

Instructors

Carmen J. Carsello, M.A.; Robert L. Foley, M.A.; Nancy L. Goodwin, M.A.; Marie L. Johnson, M.S.

Specialist in Education

Elaine Grauer, M.A.

Established to provide professional study in education, the College offers the professional courses for students preparing to teach in the elementary and secondary schools. Courses in general education and in the areas of specialization for students preparing to teach in secondary schools are administered by and taught in the various departments of the colleges. Students preparing to

teach physical education enter the School of Physical Education, and those preparing to teach in the secondary school enter the College of Liberal Arts and Sciences. See page 50 for admission requirements. The curricula for the preparation of elementary and secondary school teachers as listed in this catalog have been approved by the University, the Illinois State Certification Board, and the National Council for the Accreditation of Teacher Education.

The Council on Teacher Education

The University Council on Teacher Education is responsible for coordinating teacher education programs throughout the University and for maintaining relationships with the Chicago and the State of Illinois certification authorities. On recommendation by the University to the State Teachers Certification Board, graduates of teacher education curricula are eligible for certification in Illinois outside of Chicago. Graduates generally qualify for certification in other states and are generally eligible to take the examination for Chicago also. To be eligible for graduation and recommendation for certification a student must be enrolled in an approved program in teacher education. Graduates of curricula approved by the Council on Teacher Education are eligible for admission to the graduate college of most institutions that offer majors in the student's first or second field of specialization or in the professional areas of education. The office of the coordinator of the Council on Teacher Education is in Room 1506 University Hall.

Admission Requirements

An applicant for admission to a teacher education curriculum must meet the admission requirements of the college offering the chosen curriculum. A student who is transferring to a teacher education curriculum of the University of Illinois at Chicago Circle from another curriculum, college, or institution and who has completed 90 quarter hours of credit must present a cumulative grade point average of 3.500 or more, based on a 5.000 system, for admission in good standing. Those whose cumulative averages are less than 3.300 are not admitted to teacher education curricula.

Advising Program

Each student will be assigned an adviser in his first field of specialization. If he plans to teach English, he will have an adviser in the English Department who will guide him in his selection of courses preparatory to the teaching of English and to eligibility for certification. Elementary education students have an adviser from the College of Education.

Students who desire to enter a teaching curriculum or desire to change from one teacher education curriculum to another should consult with the dean or director of the college in which the curriculum is administered.

Advanced Standing Requirements

Continuation in teacher education curricula beyond the sophomore year is contingent on admission to advanced standing in teacher education, determined after the completion of 75 to 90 quarter hours of course work. The decision is based on the applicant's academic, personal, physical, and verbal and written communication qualifications.

Student Teaching

A professional quarter of student teaching (including a seminar) is required in the senior year. A student in teacher education completes Education 170, 210, 230 or 235, and 250 in sequence prior to student teaching. It is recommended that student teaching be completed during the eleventh quarter.

Application. A student must apply for student teaching two quarters in advance of the quarter in which student teaching is planned. The summer quarter should be excluded in the determination. Application should be made during the first two weeks of the appropriate quarter. For example, if a student plans to student-teach during the spring quarter, the application should be filed during the first two weeks of the fall quarter. Application forms may be obtained from the Office of the Director of Student Teaching, 1512 University Hall.

Usually, a student is admitted to student teaching only if he has been admitted to advanced standing in teacher education. Unless there has been deterioration in the academic or personal qualifications since he was admitted to advanced standing, a student is usually eligible for such admission. A candidate for a degree in teacher education and for eligibility for certification must complete student teaching while he is enrolled in the University of Illinois at Chicago Circle.

Student-teaching assignments will be in the Chicago and suburban public schools. For most students, an additional expense of approximately $75 will be incurred during the quarter in which the student teaching is scheduled.

Curriculum Preparatory to Teaching in Elementary Schools

For the degree of Bachelor of Arts in Elementary Education, a minimum of 180 hours, exclusive of physical education and basic military science, distributed as follows:

Language Arts ..... 24 hours
Rhetoric 101, 102–Freshman Rhetoric and Composition 8
English[1] or language[2] 8
Education 221–Children's Literature 4
Speech 171–Principles of Speech Development 4

Science 27
Biology (with laboratory) 12
Health science 3
Physical science (with laboratory) 12

Social Science 40
Geography (world regional, advanced regional) 8
American history 12
Sociology 8
Political Science 151 (local, state and national) 4
Psychology 8

Fine Arts 12
Art 204 4
Music 250 4
Creative arts 4

Mathematics 12
Mathematics for Elementary Teachers 106, 107, 108 12

Physical Education 3
Physical Education Activities for Children 220, 221 4
Required physical education ..... 6 quarters

Education 31-33
Education 170, 210, 235, 250, 270 28
Education 261–Teaching of Reading 4-8

Areas of Concentration .....12-18 hours
Mathematics—Science 51
39 hours listed above and 12 hours credit in one subject, such as mathematics or biology.
Foreign Language 30
Advanced hours in language meet the English requirement. (101-102-103 language courses excluded)
Social Science 52
40 hours listed above and 12 hours in advanced courses in one field—psychology, sociology, economics, history, philosophy, political science, geography.
Language Arts 42
24 hours listed above and 18 advanced hours.
Electives 5-17

[1]Satisfies the general education requirement in humanities.
[2]An 8-hour sequence in the literature of one foreign language at the 200 level.

Curricula Preparatory to Teaching in Secondary Schools

Each student seeking a degree and certification for teaching at the secondary level may have *two* teaching specializations. The curricula in teacher education provide for the adequate development of the major field of specialization; the minor specialization if required for graduation, should be selected from the following teacher education list of major fields of specialization. If the student needs assistance in the selection of a program for the teacher education minor, he should consult the adviser for the major.

The following table lists the fields of specialization in which degrees are granted and the total number of hours required for each.

Fields of Specialization

Total hours required are exclusive of basic military science and required physical education.

Field	*Degree Awarded*	*General Education*	*Major*	*Minor*	*Education*	*Electives*	*Total*
Biology	B.S.	40-52	48	33	28	0-14	195
Chemistry	B.S.	40-64	48	30-36	28	0-23	190
English	B.A.	52-76	52	32	28	0-18	180
French	B.A.	52	39	30	28	25-31	180
Geography	B.S.	40-64	48	35	28	10-34	180
German	B.A.	52	45	30	28	17-23	180
History	B.A.	52-76	48	30	28	0-22	180
Mathematics	B.S.	52-76	55	30	28	5-19	184
*Physical Education	B.S.						
Men		56	73		28	0-36	203
Women		69	63-69		28	29-36	195-196
Physics	B.S.	37	47	31	28	0-4	184
Political Science	B.A.	52-72 52-76	48	30	28	2-22	180
Sociology	B.A.	52	48	32	28	0-22	180
Spanish	B.A.	52-76	49	30	28	28-34	180
Speech	B.A.		48	30	28	0-22	180

*Physical Education is administered by the Division of Physical Education.

Minimum Academic Requirements for State Certificates

Effective September 1, 1967

The following table does not apply to applicants who are graduates of Illinois Approved Entitlement Programs or out-of-state recommended NCATE programs.

Required Credits in Semester Hours

Type of Certificate	Standard Elementary I	Standard High School II	Standard Special III	Junior College IV	Special V	Provisional VI
Grades certificate is valid for	Kinder-garten through 9	6 through 12	Kinder-garten through 14	13 14	11 12[p]	Kinder-garten through 12
Life of Certificate	4 years	4 years	4 years			2 years[q]
Degree required	B.A. or B.S.	B.A. or B.S.	B.A. or B.S.	B.A. or M.S.	B.A. or B.S.	B.A. or B.S.
General Education	78	42	42			
1. Language arts	8[b]	8	8			
2. Science	6[b]					
3. Mathematics	4[b]	6[f]	6[f]			
4. Social science*	6[b]	6	6			
5. Humanities	6[a, b]	6	6			
6. Health and physical education	3	3	3			
7. Additional work in any of above fields and/or psychology (except educational psychology) for a total of	78	42	42			
Professional Education	16	16	16			
1. Educational psychology**	2	2	2			
2. Methods and techniques of teaching	2[c]	2[g]	2			
3. History and/or philosophy of education	2	2	2			

Continued

4. Methods of teaching reading	2				
5. Student teaching	5[d]	5[h]	5[t]		
6. Electives in professional education for a total of	16[e]	16[j]	16		
Areas of Specialization†			32[m]	36[n]	[s]
1. One major area of specialization (16 hrs) or		32			
2. Three minor areas of specialization (18-20-24 hrs each)		48-72			
Electives	26	0-30	30		
Total	120	120	120		120

* Including a course in American history and/or government.

** Including human growth and development.

† Note: Courses offered in fulfillment of the general education requirement may also be offered as part of the hours required for the area(s) of specialization.

a Including a minimum of 1 semester hour in music and 1 semester hour in art.

b Each field (except physical education) must have a minimum of 1 additional hour, which may be in content and/or methods.

c At the elementary level.

d Grades Kindergarten–9. Those who have had 5 semester hours of student teaching above grade 9 and who have had successful teaching experience are not required to take another student teaching course at the elementary level.

e May be taken from the fields listed and/or guidance, tests and measurements, and instructional materials.

f Science and/or mathematics.

g At the secondary level or in a teaching field.

h Grades 6-12. Those who have had 5 semester hours of student teaching below grade 6 and who have had successful teaching experience are not required to take another student teaching course at the secondary level.

j *e* above plus methods of teaching reading.

m A Special Certificate in guidance will be issued to an applicant who has the required 32 semester hours in guidance and possesses a Standard Elementary, High School Certificate or another Special Certificate or a Supervisory Certificate.

n In each teaching field named in the certificate.

p Entitled to teach not more than 10 hours per week in elective subjects, providing the county superintendent of schools, having supervision of the district, certifies that no regularly certified teacher is available.

q May be renewed at the end of each 2-year period upon evidence that 8 semester hours of credit have been earned within the period, provided the requirement for the certificate of the same type issued for the teaching position for which the teacher is employed shall be met by the end of the second renewal period.

r Certificate expires June 30th following date of issue but may be renewed annually if holder earns 5 semester hours of credit approved by the Superintendent of Public Instruction in consultation with the State Teacher Certification Board.

s Must have at least a major and a minor in separate subject fields.

t In area of specialization. Those who have had 5 semester hours of student teaching experience need not take student teaching in the field of specialization.

The following rules are used in evaluating transcripts of applicants for certificates:

1. If a proficiency test is shown specifically on an official transcript(s), it may be substituted for the required semester hours of mathematics. Four years of high school mathematics may also be offered in lieu of this requirement if they are listed specifically on the official transcript. One semester hour of credit may be given for each year of high school credit in foreign languages for a total not to exceed 4 semester hours if such credit is listed on the transcript.
2. Language arts include composition, rhetoric, grammar, oral and written expression, literature, dramatics, journalism, speech, reading, spelling, and penmanship or their equivalents in integrated courses.
3. Social science must include a course in American history and/or government. Additional courses will be accepted from history, political science, sociology, economics, geography (except physical geography), and general social science or their equivalents in integrated courses.
4. "Humanities" covers courses in art, music, philosophy, foreign language, literature, and 3 hours of religion or the equivalents in integrated courses.
5. "Health and physical education" covers hygiene, health education, safety, driver education, physical education, and recreation or their equivalents in integrated courses.
6. Integrated courses providing experiences in two or more areas and in quantity comparable to suggested minimums may be approved as shown on transcript(s) or by a registrar's letter.

In addition to certificates in categories I—VI listed in the above table, the Certification Board offers other provisional, supervisory, and administrative certificates to qualified applicants. The substitute Certificate requires (1) another valid certificate, (2) a bachelor's degree, or (3) two years teaching experience and evidence of a minimum of 60 semester hours of college credit, including 6 semester hours in professional education.

The above information on academic requirements for Illinois State Certificates is excerpted from the Office of the Superintendent of Public Instruction, Bulletin #70-01-125, dated September 1, 1967, of the Illinois State Teacher Certification Board. For additional information or clarification of any of the above, consult the Illinois State Teacher Certification Board.

Minimum Academic Requirements for a Temporary Certificate for Teaching in the Chicago Public Schools

Elementary

1. Bachelor's degree based on four years of training in a fully accredited college.
2. Fifteen semester hours in elementary education.
   A. For grades 3 to 8:
      Methods courses in at least two of the following must be included—arithmetic, language arts, science, and social studies.
   B. For kindergarten through primary grades:
      At least two of the following—kindergarten methods, beginning reading, early childhood education.

High School

1. Bachelor's degree based on 4 years of training in a fully accredited college.
2. Eighteen semester hours in education, distributed according to the following minimum semester credit hours are required for high school and grades 7 through 12 teacher examinations:

	Hours
A. American public education	2
B. Principles or philosophy of education	2
C. Adolescent or educational psychology	2
D. Methods of teaching in the secondary schools	2
*E. Student teaching in grades 7 through 12	5
F. Electives in professional education	0-5
	18

Note: These requirements meet minimum standards of the State Office of Public Instruction and the North Central Association. Catalog descriptions will be consulted for consideration of equivalent courses with varying titles.

Minimum subject-matter requirements for high school.

A. Twenty semester hours in the following subject areas:
Accounting, art, business training, foreign languages, mathematics, music, physical education, stenography.

B. Twenty-four semester hours in the following subject areas:
Biology, chemistry, drafting, English, general science, geography, history, homemaking arts, industrial education, physics.

C. Eighteen semester hours in library science.

Note: For specific distribution of hours in courses within each subject area consult the Board of Examiners, Chicago Public Schools.

Trade and Vocational

1. Five years of full-time employment in the trade of the certificate or three years of full-time employment in the trade of the certificate and a bachelor's degree from a fully accredited college.
2. Current approval of the State Board of Vocational Education.

Evening Schools: Same requirements as for teachers in the day schools.

The above information was excerpted from a bulletin of the Chicago Board of Education, Board of Examiners. All temporary certificates expire June 30th of the current school year. For any additional information or clarification of any of the above, consult the Chicago Board of Education.

*One year of successful teaching in grades 7 through 12 in an accredited school may be substituted for student teaching.

The College of Engineering

David W. Levinson, Ph.D., Acting Dean of the College
Henry A. Setton, M.Ed., Assistant Dean
H. Dale Walraven, M.A., Assistant Dean
William DeFotis, M.S., Assistant to the Dean

It is the purpose of the College of Engineering of the University of Illinois at Chicago Circle to educate those young people who intend to become the engineers of tomorrow. The College is committed to the development and presentation of programs of study that will provide unexcelled opportunities for these young people to prepare for professional and scientific careers in the broad, vital, and ever-changing field of engineering.

Engineering is a complex and dynamic profession that requires tomorrow's engineers to be educated in a manner that will enable them not only to accelerate developments in their own fields but also to comprehend and utilize the advances made in other areas of technology and science. It is the intent of the College of Engineering at Chicago Circle to develop and teach engineering curricula that implement this point of view.

The broad field of engineering may be variously delineated. First, engineering may be described according to its numerous *professional* branches. Among them are the larger branches covered by aeronautical engineering, chemical engineering, civil engineering, electrical engineering, industrial engineering, and mechanical engineering. In addition, there are numerous other branches, among them agricultural, ceramic, geological, marine, mining, petroleum, sanitary, and traffic engineering.

Second, engineering may be described by the *nature,* or *type* of work the engineer performs. This delineation includes management, administration, sales and service engineering, production and construction engineering, design and development, analysis, pure and applied research and teaching.

The College of Engineering at Chicago Circle has been organized on a basis that is essentially divorced from the concepts of the *professional* branches and the *nature of work.* Instead, the College's administrative structure and its course offerings are organized on the concept of the functional areas of materials, energy, information, and systems, taught by the following departments:

The Department of Energy Engineering

Professors

James P. Hartnett, Ph.D., Head of the Department; Paul M. Chung, Ph.D.; Henry L. Garabedian, Ph.D.; Norman A. Parker, M.S., M.E.

Associate Professors

Chaim Gutfinger, Ph.D.; David S. Hacker, Ph.D.; John H. Kiefer, Ph.D.; Harold A. Simon, Ph.D.

Assistant Professors

Aemer D. Anderson, Ph.D.; Joseph C. F. Chow, Ph.D.; Wolodymyr J. Minkowycz, Ph.D.; Edward S. Pierson, Sc.D.; Calvin J. Wolf, Ph.D.

Assistants

William A. Bishop, M.S.; K.C. Majumdar, M.S.; Thomas J. Marcisz, M.S.; M. L. R. Murthy, M.S.; V. M. K. Sastri, M.S.; Eugene Y. J. Yuh, M.S.

Research Fellows

Shu-chien Yung, M.S.

The Department of Information Engineering

Herbert J. Stein, Acting Head of the Department

Professors

James W. Dow, M.D.; Lawrence Stark, M.D.

Associate Professors

Robert C. Arzbaecher, Ph.D.; Kurt Burian, Ph.D.; Earl E. Gose, Ph.D.; Derek P. Hendry, Ph.D.; Henry A. Setton, M.Ed.; Herbert J. Stein, Ph.D.; Arne Troelstra, Ph.D.

Assistant Professors

Jerrold Bernstein, M.D.; Jerald S. Brodkey, M.D.; Daniel Censor, Ph.D.; William DeFotis, M.S.; Chu-quon Lee, Ph.D.; Joel A. Michael, Ph.D.; Tadao Murata, Ph.D.; Howard Prosser, M.S.; Devendar C. Reddy, Ph.D.; Stephen Tsai, Ph.D.; Bert L. Zuber, Ph.D.

Instructors

George L. Brown, M.S.; John A. Campbell, Ph.D.; Roger Conant, M.S.; Peter Lohnberg, M.S.; Gerald A. Masek, M.S.; Raymond Palciauskas, M.S.; James D. Smith. B.S.; Milton Zerkin, M.S.

Assistants

Gabriel M. Gauthier, M.S.; A. Harry Klopf, M.S.; Jeffrey Levett, B.S.; Donald P. Martin, B.S.; Anthony W. Mucciardi, M.S.; Carol L. Reynolds, B.S.; Hollis R. Sunderland, B.S.

Lecturers

Joseph F. Terdiman, M.D.

Research Associates

Allen Sandberg, Sc.D.

The Department of Materials Engineering

Professors

Ernest F. Masur, Ph.D.; Head of the Department; David W. Levinson, Ph.D.; Thomas H. Blewitt, Sc. D.; William Rostoker, Ph.D.; Robert L. Schiffman, Ph.D.

Associate Professors

Robert F. Domagala, M.S.; James M. Doyle, Ph.D.; Roy B. Perkins, M.S.; Albert B. Schultz, Ph.D.; Thomas C.T. Ting, Ph.D.

Assistant Professors

Robert H. Bryant, Ph.D.; Yao-wen Chang, Ph.D.; Mahmoud Khojasteh, Ph.D.; Charles A. Moore, Ph.D.; Thomas M. Mulcahy, Ph.D.; Karl H. Otte, M.S.; Walid H. Rimawi, Ph.D.; Daniel F. Schoeberle, Ph.D.; Surendra P. Shah, Ph.D.; Otto E. Widera, Ph.D.; Chien-heng Wu, Ph.D.

Instructors

Sushil Chandra, Ph.D.

Assistants

Peter A. Tuschak, M.S.

Lecturers

Evan H. Greener, Ph.D.; E. P. Lautenschlager, Ph.D.; Charles A. Timko, Ph.D.

The Department of Systems Engineering

Leon N. Blair, Acting Head of the Department

Professors

Samuel E. Shapiro, B.S.; H. Dale Walraven, M.A.

Associate Professors

Leon N. Blair, B.S.: Richard C. Kohler, Ed.D.; Fred W. Schroeder, M.S.

Assistant Professors

Gyan C. Agarwal, Ph.D.; Truman C. Buss, B.S.; M.V.J. Dembski, M.A.; Vytas B. Gylys, Ph.D.; Wayne Madsen, Ph.D.; Francis A. Mosillo, M.S.; William D. O'Neill, Ph.D.; Joseph L. Schofer, Ph.D.

Instructors

Edward J. Caldario, M.S.; Claude Cohen, M.S.; Robert Pancner, B.S.

Emeriti

Professors

Clarence I. Carlson, B.S., General Engineering; Arnold C. Cobb, M.S., Thermodynamics; Joseph S. Kozacka, M.S., Mechanical Engineering; Frederick W. Trezise, M.A., Engineering Science, Associate Dean of the College.

Associate Professors

Edward H. Coe, C.E.; Dee M. Holladay, B.S.

Assistant Professors

Richard S. Royster, M.A.

Major Fields of Concentration

All of the courses in the College of Engineering are offered by the foregoing departments. A student seeking a Bachelor of Science in Engineering may decide to pursue a major field of concentration in which most of his major courses will fall within a single department; alternatively, his elected field of

concentration might well be of such a nature that his major courses would overlap two or more departments. In short, it is the policy and the intention of the College of Engineering to present programs of study that are flexible, adaptable, and versatile.

Each student, after his first year of enrollment and in periodic consultation with his adviser, will select one of the following major fields of concentration that his interests and abilities indicate is appropriate:

Aerospace Science
Applied Mechanics
Applied Physics
Bioengineering
Chemical Engineering
Communications Engineering
Computer Science
Energy Conversion
Manufacturing Engineering
Mechanical Analysis and Design
Metallurgy
Operations Research
Soil Engineering
Structural Design
Structural Mechanics
Systems Analysis
Thermal Science
Water and Air Resources
Wave Propagation and Radiation

Any one of these fields will prepare a student, upon receipt of the degree of Bachelor of Science in Engineering, to enter any one of the large number of engineering fields. The curricula are sufficiently basic and have enough material in common to provide a wide range for career selection, regardless of the post-graduation path that is followed.

These major fields also provide an excellent background for graduate study. At present, the College of Engineering offers programs leading to the degrees of Master of Science in Thermosciences, and Master of Science in Mechanics and Materials. Detailed information on these graduate programs may be obtained from the Catalog of the Graduate College.

The Common Core Curriculum

The courses in this curriculum are taken by every undergraduate engineering student, regardless of his major. The Common Core Curriculum provides the student with a broad base in mathematics, physics, chemistry, and the engineering sciences. The courses of the first four quarters are as follows:

First Year

First Quarter	*Hours*
Mathematics 130–Analytic Geometry	5
Systems Engineering 151*–Introduction to Engineering Design I	4
Rhetoric 101	4
Humanities or social science elective	4
Physical education	1

Second Quarter

Mathematics 131–Calculus I	5
Systems Engineering 152*–Introduction to Engineering Design II	4
Rhetoric 102	4
Physics 111–General Physics I (Mechanics)	4
Physical education	1

Third Quarter

Mathematics 132–Calculus II	5
Systems Engineering 153*–Introduction to Engineering Design III	4

*Beginning freshmen who are not registered in the Systems Engineering 151, 152, 153 sequence must register for Systems Engineering 103, Materials Engineering 111, and an elective.

Materials Engineering 142–Properties of Materials I	4
Physics 112–General Physics II (Mechanics, Thermodynamics)	5
Physical education	1

Second Year

First Quarter

Mathematics 133–Calculus III	5
Chemistry 194–Chemistry for Engineers I	4
Materials Engineering 101–Engineering Mechanics I	3
Physics 113–General Physics III (Electricity and Magnetism)	5
Physical education	1

Additional Core Courses

The following courses are also part of the core curriculum and must be taken by every undergraduate student in engineering, regardless of his major. The quarter in which these courses are taken will depend on the major field the student has chosen.

	Hours
Chemistry 195	4
Energy Engineering 201	4
Energy Engineering 211	4
Information Engineering 210	5
Information Engineering 229	4
Information Engineering 240	4
Materials Engineering 102	3
Materials Engineering 103	3
Materials Engineering 230	4
Mathematics 195	3
Mathematics 220	3
Physics 114	5

The Mathematics and Chemistry Placement Tests

All new students who enter the College of Engineering must take the Mathematics Placement Test unless they have completed college-level work in algebra or trigonometry with a grade of D or better. Transfer students presenting

such college-level credit must be required to take the Mathematics Placement Test at the discretion of the Dean of the College of Engineering.

All students who present high school credit in chemistry must take the Chemistry Placement Test. Those who receive a low score must register in Chemistry 193 during one of the quarters of the freshman year. Students who have not had high school chemistry will take Chemistry 111 (3 hours of credit) instead of the elective scheduled for the first quarter.

Foreign Language Requirement

The College requires 2 units of entrance credit in foreign language. A student deficient in this requirement may be admitted, but he must, by not later than the end of his second year, remove the deficiency by completing the 101, 102, 103 sequence in any language taught at the University. Credit so earned does not count toward graduation.

Physical Education Requirement

Every student must complete six quarter hours of credit in physical education unless he is a transfer student with 90 or more hours of credit or is a veteran. This requirement should be completed within the first six quarters of attendance.

Elective Courses

All engineering curricula allot a block of 27 quarter hours to elective courses. Although these electives may be both technical and nontechnical, the student is expected to maintain a reasonable balance between them. Electives are selected in conference with the student's adviser.

Humanistic-Social Science Courses and Rhetoric

An additional block of 24 quarter hours of electives in the humanities and the social sciences is included in all engineering curricula in addition to a minimum of 8 quarter hours in rhetoric. A minimum distribution of 9 hours in the humanities and 9 hours in the social sciences is required to fulfill the general education requirements of the University. Therefore, the College of Engineering requires students to take any two courses of sequences, from the recommended list, in both the social sciences and the humanities. With the consent of his adviser and the approval of the College Office, a student will be permitted to add other sequences or courses to the list.

Humanities and Social Sciences Sequences

Humanities	*Social Sciences*
Architecture and Art 142, 143, 144	Anthropology 102, 103, 104
Art 115	Economics 120, 121, 324
English 101, 102, 103	Economics 120, 121
English 113, 114	Economics 320, 321
English 121, 122, 123	Economics 322, 323
English 131	Economics 326, 327
English 150, 151, 152	Geography 101, 102, 103
*French 101, 102, 103, 104, 105, 106	Geography 104, 105
*German 101, 102, 103, 104, 105, 106	Political Science 150, 151
History 110, 111, 112, 113	Psychology 100, 115
History 131, 132, 133	Psychology 100, 130
History 151, 152, 153	Psychology 210
History 181, 182, 183	Psychology 215
History 322	Rhetoric 251
Humanities 101, 102, 103	Sociology 100, 130, 131
Humanities 106, 107, 108	Sociology 346
Humanities 151, 152, 153	Speech 101
Information Engineering 201	Speech 111, 112, 113
*Latin 101, 102, 103, 104, 105, 106	
Music 130, 131, 132	
Philosophy 101, 102, 103	
Philosophy 201	
Philosophy 203	
Philosophy 222	
*Russian 101, 102, 103, 104, 105, 106	
*Spanish 101, 102, 103, 104, 105, 106	

Graduation Requirements

A total of 198 quarter hours of credit, exclusive of physical education and military science, is required of all students seeking a degree in the College of Engineering. All of the general University requirements for graduation must also be met. See General University Requirements.

Satisfactory completion of these requirements leads to the degree of Bachelor of Science in Engineering with a major in one of the fields of concentration.

The engineering curriculum is designed to be completed in 12 quarters, usually covered in four calendar years. Many students, however, elect to take more than 12 quarters, with a reduced load in some or in all quarters. Extension of the graduation date may be avoided by attending four, rather than three, quarters per calendar year. However, in some cases the wise alternative may be to extend the graduation date.

Transfer Students

The College of Engineering admits qualified transfer students from other

*Students will not receive credit for 101, 102, 103 in a language taken in high school.

institutions. With proper planning, a prospective transfer student may avoid losing appreciable time toward graduation.

Prospective transfer students should plan their programs at the school they are currently attending as nearly as possible in accordance with the curriculum requirements stated in this Catalog. Since technical-course offerings are limited in some colleges, prospective transfer students may find it to their advantage to complete, at the college they are currently attending, some of the humanities and social science requirements, particularly during the freshman and sophomore years.

The prospective transfer student whose courses most nearly parallel the offerings at Chicago Circle in content and credit hours effects the transfer most easily. This is particularly true of courses in mathematics, physics, chemistry, and the elementary engineering sciences.

The Major Fields of Concentration and the Required Courses

A block of 36 quarter hours is allotted to the required courses in the student's major field of concentration. This provides in-depth knowledge in that field. The nineteen major areas of concentration and the sequence of courses taken during a student's undergraduate years after the fourth quarter are listed in the following sections. See the Common Core Curriculum for the courses of the first four quarters.

Aerospace Science

The rate of technological progress in aerospace sciences has been exceedingly rapid during the past decade, highlighting an area of considerable challenge in modern society. It is the objective of this major area to prepare students who have strong basic analytical and experimental interests to handle both present and future problems in the areas of aeronautics and astronautics.

The curriculum extends the basic work in fluid and solid mechanics to more advanced studies in compressible aerodynamics, aeromechanics and high energy gas physics. This program prepares the student for participation in the design and development of aerospace vehicles. With additional course work, the student may prepare himself for further specialization in either the aerodynamic or structural aspects of vehicle design. In summary, the graduate of this program is prepared to enter the aerospace or aeronautical industry either directly or through further study at the graduate level.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 195–Introduction to Automatic Digital Computing	3
Mathematics 220–Elementary Differential Equations I	3

Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Physical education	1
Third Quarter	
Materials Engineering 103–Engineering Mechanics III	3
Materials Engineering 230–Properties of Materials II	4
Information Engineering 229–Introduction to Electromagnetic Fields	5
Energy Engineering 201–Thermodynamics	4
Physical education	1

Third Year

First Quarter	
Energy Engineering 211–Fluid Mechanics	4
Energy Engineering 202–Intermediate Thermodynamics	4
Information Engineering 210–Introduction to Circuit Analysis	5
Elective	
Second Quarter	
Energy Engineering 212–Potential Flow	4
Information Engineering 240–Introduction to Electronics	4
Materials Engineering 204–Mechanics of Solids I	4
Elective	
Third Quarter	
Energy Engineering 213–Compressible Flow	4
One of the Following:	4
Materials Engineering 205–Mechanics of Solids II	
Materials Engineering 208–Mechanical Vibrations	
Electives	

Fourth Year

First Quarter	
Energy Engineering 214–Viscous Fluid Mechanics	4
Materials Engineering 206–Mechanics of Solids III	4
Electives	
Second Quarter	
Energy Engineering 281–Design	4
Electives	
Third Quarter	
Energy Engineering 282–Design	4
Electives	

Applied Mechanics

The field of applied mechanics represents one of the principal foundations of engineering science, and the curriculum major in applied mechanics is therefore designed to give the student a broad introduction to the scientific

basis of much of modern engineering practice and research. Although graduates with this major should have no difficulty in entering a variety of positions in industry, applied mechanics has particular appeal to students with strong analytical or experimental research interests.

The required courses consist primarily of offerings in the Departments of Materials Engineering, Energy Engineering, and Mathematics, which introduce the student to the fundamentals of solid and fluid mechanics and to the mathematical tools needed for these disciplines. At the same time, because of the breadth of the subject matter covered in this major, a choice of areas of specialization in accord with his needs and interests is open to the student in his senior year.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 220–Elementary Differential Equations I	3
Materials Engineering 230–Properties of Materials II	4
Physical education	1
Third Quarter	
Mathematics 195–Introduction to Automatic Digital Computing	3
Energy Engineering 201–Thermodynamics	4
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Materials Engineering 103–Engineering Mechanics III	3
Physical education	1

Third Year

First Quarter	
Energy Engineering 211–Fluid Mechanics	4
Materials Engineering 204–Mechanics of Solids I	4
Mathematics 310–Higher Analysis I	4
Elective	
Second Quarter	
Mathematics 311–Higher Analysis II	3
Energy Engineering 212–Potential Flow	4
Information Engineering 210–Introduction to Circuit Analysis	5
Elective	
Third Quarter	
Materials Engineering 208–Mechanical Vibrations	4
Information Engineering 229–Introduction to Electromagnetic Fields	4
Electives	

Fourth Year

First Quarter	
Materials Engineering 301–Introduction to the Mechanics of Continua	4

Information Engineering 240–Introduction to Electronics 4
Electives

Second Quarter
Energy Engineering 310–Continuum Fluid Mechanics 4
One of the following: 4
Materials Engineering 206–Mechanics of Solids III
Materials Engineering 303–Theory of Elasticity I
Materials Engineering 312–Nonlinear Oscillations
Energy Engineering 202–Intermediate Thermodynamics
Energy Engineering 304–Elementary Transport Phenomena
Energy Engineering 213–Compressible Flow
Electives

Third Quarter
Materials Engineering 311–Intermediate Dynamics
Electives

Applied Physics

This sequence of courses provides engineering students with a strong background in physics. It concentrates on fundamental topics for those students who intend to pursue a career in physics or in one of the physics-oriented areas of engineering.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	3
Physical education	1

Third Quarter	
Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 201–Thermodynamics	4
Physical education	1
Elective	

Third Year

First Quarter
Physics 301–Electricity and Magnetism I 4
Physics 321–Atomic Physics 4
Information Engineering 229–Introduction to Electromagnetic Fields 4
Elective

Second Quarter
Physics 302–Electricity and Magnetism II 4

Physics 322–Atomic and Molecular Physics 4
Information Engineering 210–Introduction to Circuit Analysis 5
Elective

Third Quarter
Physics 303–Electricity and Magnetism III 4
One of the following:
Physics 323–Elementary Solid State Physics
Physics 331–Nuclear Physics
Electives

Fourth Year
First Quarter
Physics 341–Theoretical Mechanics I 4
Physics 361–Thermal and Statistical Physics I 4
Information Engineering 240–Introduction to Electronics 4
Electives

Second Quarter
Physics 371–Light (Wave Optics) 4
Energy Engineering 211–Fluid Mechanics 4
Electives

Third Quarter
Materials Engineering 230–Properties of Materials II 4
Electives

Bioengineering

A major sequence leading to the Bachelor of Science in Engineering with a major in bioengineering has been formulated to prepare students for either graduate or medical school as well as to equip students for high-level positions elsewhere. At present, bioengineers are sought by government, university, and hospital-associated laboratories and by a large industrial segment, including the aircraft, aerospace, electrical, and automotive industries.

The bioengineering major is designed to balance a student's education in the basic engineering and biological sciences; the degree recipient will reach the bachelor's level in both engineering and biology. In addition, students take those bioengineering courses offered by the Department of Information Engineering that cover basic bioengineering science. These include the application of the theories of information, communication, and control to complex physiological systems; the use of artificial intelligence and pattern recognition; and applications of the digital computer in biology and medicine.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3

Mathematics 195–Introduction to Automatic Digital Computing	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	3
Physical education	1

Third Quarter

Information Engineering 229–Introduction to Electromagnetic Fields	4
Energy Engineering 201–Thermodynamics	4
Materials Engineering 230–Properties of Materials II	4
Information Engineering 210–Introduction to Circuit Analysis	5
Physical education	1

Third Year

First Quarter

Information Engineering 240–Introduction to Electronics	4
Information Engineering 100–General Biology	4
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 211–Fluid Mechanics	4

Second Quarter

Information Engineering 310–Signal Processing	4
Information Engineering 101–General Biology	4
Electives	

Third Quarter

Information Engineering 311–Linear Systems Analysis	4
Information Engineering 102–General Biology	4
Electives	

Fourth Year

First Quarter

Information Engineering 352–Biocontrol	3
Information Engineering 353–Biocontrol Laboratory	3
Information Engineering 284–Cellular Biodynamics	5

Second Quarter

Information Engineering 283–General Genetics	5
Electives	

Third Quarter

Electives

Chemical Engineering

This major sequence is offered for students interested in entering the chemical or process industry or in doing graduate work in chemical engineering. It provides the student with a firm grounding in classical chemistry and in basic engineering principles. The graduate of this program is equipped to meet the needs of this ever-growing sector of the economy. Emphasis is placed on a

mastery of basic chemical principles and a thorough knowledge of the engineering aspects of fluid mechanics, thermodynamics, and heat and mass transfer. The flexibility of the program permits a student to select a career in biochemical, inorganic, organic, or petro-chemical plant processing, and plant design and engineering or to continue into graduate study.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 220–Elementary Differential Equations I	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Physical education	1
Third Quarter	
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 201–Thermodynamics	4
Mathematics 195–Introduction to Automatic Digital Computing	3
Chemistry 221–Study of Chemical Systems	3
Physical education	1

Third Year

First Quarter	
Energy Engineering 211–Fluid Mechanics	4
Energy Engineering 232–Chemical Process Analysis	3
Chemistry 233–Organic Chemistry I	5
Elective	
Second Quarter	
Energy Engineering 231–Chemical Reaction Thermodynamics I	4
Chemistry 342–Physical Chemistry II	3
Chemistry 343–Physical Chemistry Laboratory II	2
Information Engineering 240–Introduction to Electronics	4
Elective	
Third Quarter	
Chemistry 234–Organic Chemistry II	5
Materials Engineering 230–Properties of Materials II	4
Information Engineering 229–Introduction to Electromagnetic Fields	4
Elective	

Fourth Year

First Quarter	
Energy Engineering 385–Chemical Process Design I	4
Electives	
Second Quarter	
Energy Engineering 386–Chemical Process Design II	4
Energy Engineering 331–Chemical Reaction Thermodynamics II	3
Electives	

Third Quarter

Information Engineering 210–Introduction to Circuit Analysis	5
Electives	

Communications Engineering

In the communications engineering major the junior year provides a concise, modern approach to several areas of electrical engineering, including signal processing, linear analysis, introductory communication theory, electronics, and wave propagation and radiation. Senior-level work can be planned for specialization in at least one of the following areas:

Network Analysis and Synthesis	Electronic Applications
Communications Theory	Automatic Control Theory

The program offers sufficient versatility, through the proper use of electives, for a student to prepare for immediate entry into industry or for admission to graduate school. This area of concentration is similar to the curricula in electrical engineering presented in many institutions. Graduates of this program have an almost unlimited variety of job opportunities in industry or government in research, development, design, operations, sales, or administration.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 195–Introduction to Automatic Digital Computing	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	4
Physical education	1

Third Quarter

Information Engineering 229–Introduction to Electromagnetic Fields	4
Energy Engineering 201–Thermodynamics	4
Materials Engineering 230–Properties of Materials II	4
Information Engineering 210–Introduction to Circuit Analysis	5
Physical education	1

Third Year

First Quarter

Information Engineering 240–Introduction to Electronics	4
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 211–Fluid Mechanics	4
Electives	

Second Quarter

Information Engineering 310–Signal Processing	4
Information Engineering 340–Intermediate Electronics	4

Information Engineering 221–Introductory Electromagnetic Field Theory 3
Elective

Third Quarter
Information Engineering 311–Linear Analysis 4
Information Engineering 320–Introductory Wave Propagation and Transmission 5
Information Engineering 342–Solid State Electronics 4
Elective

Fourth Year
First Quarter
Information Engineering 312–Introduction to Communication Engineering 4
Electives

Second Quarter
One of the following: 4
Information Engineering 315–Intermediate Network Analysis
Information Engineering 330–Communication Theory I
Information Engineering 344–Electronic Applications I
Information Engineering 360–Automatic Control Theory I
Electives

Third Quarter
One of the following: 4
Information Engineering 316–Introduction to Network Synthesis
Information Engineering 331–Communication Theory II
Information Engineering 345–Electronic Applications II
Information Engineering 361–Automatic Control Theory II
Electives

Computer Science

The major in computer science is a fusion of certain areas in electrical engineering (hardware) and mathematics (software). Beginning in the junior year the student studies certain of the subjects required in communications engineering, including courses in signal processing, linear analysis, introductory communication theory, and electronics. At the same time, he is required to complete a block of mathematically oriented courses dealing with numerical analysis techniques and the theory of computing machines. The student may use his elective courses to emphasize, either in the hardware or software area, subjects of additional interest to him.

The versatility of this major also permits the student to prepare himself for various alternatives upon graduation. With the ascendancy of computer theory and techniques in modern technology, graduates of this program have roughly the same variety of job opportunities as those in communications engineering.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 195–Introduction to Automatic Digital Computing	3
Physics 114—General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220—Elementary Differential Equations I	3
Physical education	1
Third Quarter	
Information Engineering 229–Introduction to Electromagnetic Fields	4
Energy Engineering 201–Thermodynamics	4
Materials Engineering 230–Properties of Materials II	4
Information Engineering 210–Introduction to Circuit Analysis	5
Physical education	1

Third Year

First Quarter	
Information Engineering 240–Introduction to Electronics	4
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 211–Fluid Mechanics	4
Mathematics 310–Higher Analysis I	4
Second Quarter	
Information Engineering 310–Signal Processing	4
Information Engineering 340–Intermediate Electronics	4
Mathematics 387–Numerical Methods I	3
Electives	
Third Quarter	
Information Engineering 311–Linear Systems Analysis	4
Mathematics 388–Numerical Methods II	3
Information Engineering 371–Computer Systems I	4

Fourth Year

First Quarter	
Information Engineering 312–Introduction to Communication Engineering	4
Information Engineering 372–Computer Systems II	3
Electives	
Second Quarter	
Information Engineering 373–Computer Systems III	3
Electives	
Third Quarter	
Electives	

Energy Conversion

The major in energy conversion places the emphasis on the physical princi-

ples governing the conversion of energy between equivalent forms (for example, nuclear to electrical) and on consideration of devices in which such conversion can be realized. The required courses provide the necessary mathematical tools and extend the engineering core material in electromagnetic theory, fluid mechanics, and thermodynamics. With this background, the student may then specialize in a large number of areas, either to prepare himself for graduate study and research or to enter industry. The spectrum of departmental activities in this major are exemplified by special engineering areas that include electrical power systems, high-speed transportation, and novel conversion methods, such as magneto-hydrodynamics and fuel cells.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 195–Introduction to Automatic Digital Computing	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220—Elementary Differential Equations I	3
Physical Education	1
Third Quarter	
Information Engineering 229–Introduction to Electromagnetic Fields	4
Energy Engineering 201–Thermodynamics	4
Materials Engineering 230–Properties of Materials II	4
Information Engineering 210–Introduction to Circuit Analysis	5
Physical education	1

Third Year

First Quarter	
Information Engineering 240–Introduction to Electronics	4
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 211–Fluid Mechanics	4
Energy Engineering 202–Intermediate Thermodynamics	4
Elective	
Second Quarter	
Information Engineering 310–Signal Processing	4
Information Engineering 340–Intermediate Electronics	4
Information Engineering 221–Introductory Electromagnetic Field Theory	3
Electives	
Third Quarter	
Information Engineering 311–Linear Systems Analysis	4
Information Engineering 320–Introductory Wave Propagation and Transmission	5
Electives	

Fourth Year

First Quarter	
Energy Engineering 351–Electromechanical Energy Conversion I	4
Electives	

Second Quarter

Energy Engineering 352–Electromechanical Energy Conversion II	4
Electives	

Third Quarter

Energy Engineering 353–Direct Energy Conversion	4
Electives	

Manufacturing Engineering

The manufacture of finished products involves interrelationships between machine design, machine control, fabrication, and service properties of materials as they relate to efficiency, productivity, quality, and cost. The courses are arranged to build upon the core courses in information, mechanical, materials, and energy sciences to ensure a comprehension of the manifold factors involved in a successful manufacturing process. The curriculum includes: (1) basic machine design principles associated with measuring and machine capability; (2) application of computer methods and related equipment to machine control; (3) influence of materials on the process and the process on materials; (4) selection of materials to meet service requirements; and (5) the relation of economics to material and process selection.

This curriculum is aimed at educating engineers to enter the wide spectrum of manufacturing industries engaged in producing finished components and assemblies of components which represent marketable products. The arrangement of courses in operations, design, and costing is therefore basic training for engineering supervision and plant management.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	3
Physical education	1

Third Quarter

Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Materials Engineering 230–Properties of Materials II	4
Energy Engineering 201–Thermodynamics	4
Physical education	1

Third Year

First Quarter

Energy Engineering 211–Fluid Mechanics	4
Information Engineering 210–Introduction to Circuit Analysis	5
Materials Engineering 204–Mechanics of Solids I	4
Elective	

Second Quarter

Materials Engineering 246–Numerical Control Processing	3
Information Engineering 229–Introduction to Electromagnetic Fields	4
Electives	

Third Quarter

Information Engineering 240–Introduction to Electronics	4
Materials Engineering 208–Mechanical Vibrations	4
Electives	

Fourth Year

First Quarter

Materials Engineering 241–Materials Processing I	4
Materials Engineering 313–Applied Dynamics	4
Electives	

Second Quarter

Materials Engineering 244–Materials Processing II	4
Materials Engineering 242–Materials Processing Laboratory I	1
Materials Engineering 333–Design Use of Materials	4
Electives	

Third Quarter

Materials Engineering 247–Manufacturing Cost Analysis	3
Materials Engineering 249–Materials Processing IV	4
Materials Engineering 245–Materials Processing Laboratory II	1
Electives	

Mechanical Analysis and Design

This major acquaints the student with the fundamental disciplines involved in the design of machinery. The engineering graduate with this option is likely to join one of many manufacturing industries.

In order to give the student a large choice in the selection of his future career as well as to enable him to keep up with developments in industry after graduation, the emphasis in this option is on fundamentals, which include, in addition to stress analysis, the study of mechanical vibrations and mechanisms and the design use of materials. A comprehensive design project incorporating these principles and completed by the student in his senior year summarizes and deepens his comprehension.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry of Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	3
Physical education	1

Third Quarter

Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Materials Engineering 230–Properties of Materials II	4
Energy Engineering 201–Thermodynamics	4
Physical education	1

Third Year

First Quarter

Materials Engineering 204–Mechanics of Solids I	4
Mathematics 310–Higher Analysis I	4
Energy Engineering 211–Fluid Mechanics	4
Elective	

Second Quarter

Materials Engineering 209–Analysis and Synthesis of Mechanisms	4
Mathematics 311–Higher Analysis II	3
Information Engineering 210–Introduction to Circuit Analysis	5
Elective	

Third Quarter

Materials Engineering 206–Mechanics of Solids III	4
Materials Engineering 208–Mechanical Vibrations	4
Information Engineering 229–Introduction to Electromagnetic Fields	5

Fourth Year

First Quarter

Materials Engineering 313–Applied Dynamics	4
Information Engineering 240–Introduction to Electronics	4
Electives	

Second Quarter

Materials Engineering 333–Design Use of Materials	4
Electives	

Third Quarter

Materials Engineering 382–Design Project in Mechanical Analysis and Design	4

Metallurgy

The program in metallurgy combines studies of material science with the more important aspects of metallurgical engineering. Of the 36 quarter hours devoted to the major, approximately one half are devoted to studies of physical metallurgy, X-ray metallography, metallurgical thermodynamics, and metal physics; the remainder are devoted to a materials processing sequence which includes study of metalworking, powder metallurgy, welding and brazing, casting, and process control.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	3
Physical education	1
Third Quarter	
Materials Engineering 230–Properties of Materials II	4
Information Engineering 229–Introduction to Electromagnetic Fields	4
Energy Engineering 201–Thermodynamics	4
Mathematics 195–Introduction to Automatic Digital Computing	3
Physical education	1

Third Year

First Quarter	
Materials Engineering 250–Physical Metallurgy I	3
Materials Engineering 253–Physical Metallurgy Laboratory I	1
Information Engineering 210–Introduction to Circuit Analysis	5
Materials Engineering 103–Engineering Mechanics III	3
Second Quarter	
Materials Engineering 251–Physical Metallurgy II	3
Materials Engineering 254–Physical Metallurgy Laboratory II	1
Energy Engineering 211–Fluid Mechanics	4
Elective	
Third Quarter	
Materials Engineering 252–Physical Metallurgy III	3
Materials Engineering 255–Physical Metallurgy Laboratory III	1
Information Engineering 250–Introduction to Electronics	4
Elective	

Fourth Year

First Quarter	
Materials Engineering 239–X-ray Metallography I	3
Materials Engineering 241–Materials Processing I	4
Electives	
Second Quarter	
Materials Engineering 243–Metallurgical Problems	3
Materials Engineering 244–Materials Processing II	4
Materials Engineering 242–Materials Processing Laboratory I	1
Electives	
Third Quarter	
Materials Engineering 248–Materials Processing III	4
Materials Engineering 245–Materials Processing Laboratory II	1
Materials Engineering 333–Design Use of Materials	4
Elective	

Operations Research

Operations research is a cross-discipline between engineering, economics, and mathematics. This area of study provides a broader and more modern background covering a large part of what has been traditionally known as industrial engineering.

The concentration here is on mathematical modeling of industrial and socio-economic systems. In addition to the common core program, the operations research curriculum requires courses in modeling and analysis of lumped parameter systems, optimization techniques for design, fundamentals of economics, probability and statistical theories, and their applications in socio-economic systems.

The increasing cost of materials and labor, huge capital investments and competition in industries make it necessary to employ optimal policies for the operation of any industrial complex. The methods of operations research often provide answers for such complex problems. These methods heavily rely on modern electronic computers.

The demand for operations research engineers comes from NASA, the Department of Defense, many other government agencies, and from most research and development, design, sales, and management industries.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 220–Elementary Differential Equations I	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Physical education	1
Third Quarter	
Information Engineering 210–Introduction to Circuit Analysis	5
Economics 120–Principles of Economics I	4
Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Physical education	1

Third Year

First Quarter	
Systems Engineering 311–Introduction to Systems Analysis I	4
Economics 121–Principles of Economics II	4
Information Engineering 229–Introduction to Electromagnetic Field Theory	4
Energy Engineering 201–Thermodynamics	4
Second Quarter	
Systems Engineering 312–Introduction to Systems Analysis II	4
Mathematics 370–Introduction to Probability and Statistics	3
Materials Engineering 230–Properties of Materials II	4
Information Engineering 240–Introduction to Electronics	4

Third Quarter

Energy Engineering 211–Fluid Mechanics	4
Systems Engineering 350–Stochastic Processes	4
Systems Engineering 313–Introduction to Systems Analysis III	4
Elective	

Fourth Year

First Quarter

Systems Engineering 371–Optimization Techniques I	4
Electives	

Second Quarter

Systems Engineering 372–Optimization Techniques II	4
Electives	

Third Quarter

Electives

Soil Engineering

Soil engineering is concerned with the use of soil and rock as an engineering material. Soil engineering is a branch of civil engineering, and as such, it carries a strong professional motivation. In an engineering organization the soil engineer has the responsibility for the analysis and design of earth structures, such as earth dams and embankments, and foundations for bridges, buildings, and retaining structures. The soil engineer is also responsible for the design of highway pavement systems.

In addition to the professional activities of the soil engineer, the subject has a strong and varied research potential, both basic and applied. Research activities vary from the study of the physics and chemistry of clay-water systems to the development of field measurement programs. Research in soil engineering has many interdisciplinary aspects, having direct and indirect applications in computer science, water resources, biomechanics, pertoleum engineering, and the like.

The curriculum in soil engineering is designed for flexibility of course sequences. The required courses for the major provide a balanced program of theoretical soil mechanics, soil behavior, and foundation engineering. Beyond this, the student may, if he desires, concentrate in the following areas:

1. Microscopic properties of soils—the study of soil composition from a physiochemical viewpoint; the influence of microscopic properties on soil behavior.
2. Soil behavior—the study of the engineering properties of soil and the influence of environmental conditions on these properties.
3. Theoretical soil mechanics—the study of the theories of soil mechanics; the physical basis for mathematical models; the engineering implications of theoretical results.
4. Foundation engineering—the study of principles and techniques of design

of foundations for bridges and buildings; the design of earth dams and embankments; the design of highway pavement systems.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 220–Elementary Differential Equations I	3
Energy Engineering 201–Thermodynamics	4
Physical education	1
Third Quarter	
Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 211–Fluid Mechanics	4
Materials Engineering 230–Properties of Materials II	4
Physical education	1

Third Year

First Quarter	
Information Engineering 229–Introduction to Electromagnetic Fields	4
Information Engineering 210–Introduction to Circuit Analysis	5
Materials Engineering 202–Soil Behavior	4
Geology 150–Geology for Engineers	4
Second Quarter	
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Information Engineering 240–Introduction to Electronics	4
Materials Engineering 226–Foundation Engineering	3
Materials Engineering 204–Mechanics of Solids I	4
Third Quarter	
Materials Engineering 210–Experimental Soil Mechanics	3
Materials Engineering 203–Composition and Properties of Concrete	3
Materials Engineering 205–Mechanics of Solids II	4
Electives	

Fourth Year

First Quarter	
Materials Engineering 341–Theoretical Soil Mechanics I	3
Materials Engineering 206–Mechanics of Solids III	4
Electives	
Second Quarter	
Energy Engineering 312–Porous Media	4
Electives	
Third Quarter	
Electives	

Structural Design

With the advent of the electronic computer, the function of the structural designer has undergone a profound change in recent years. Routine calculations, drafting, and other necessary chores are now largely turned over to non-engineers. The structural engineer, with the help of the computer, concentrates on the true job of "design"—that is, the selection of the best possible solution to satisfy the need of our society for housing, hospitals, factories, and bridges.

The structural design major incorporates these changes and prepares the student for his new role as a structural engineer. In addition to a brief introduction to the design practices and codes in connection with various common structural materials, such as steel and reinforced concrete, the primary emphasis is on acquainting the student with the fundamentals of structural theory, the properties of structural materials, and the use of the computer in the solution of problems in design. Recent developments in limit design and structural dynamics are also included.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	3
Physical education	1
Third Quarter	
Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Materials Engineering 230–Properties of Materials II	4
Energy Engineering 201–Thermodynamics	4
Physical education	1

Third Year

First Quarter	
Energy Engineering 211–Fluid Mechanics	4
Materials Engineering 204–Mechanics of Solids I	4
Materials Engineering 203–Composition and Properties of Concrete	3
Materials Engineering 210–Experimental Soil Mechanics	3
Second Quarter	
Information Engineering 210–Introduction to Circuit Analysis	5
Materials Engineering 205–Mechanics of Solids II	4
Electives	
Third Quarter	
Materials Engineering 207–Structural Analysis I	4
Information Engineering 229–Introduction to Electromagnetic Fields	4
Electives	

Fourth Year

First Quarter

Information Engineering 240–Introduction to Electronics	4
Materials Engineering 221–Behavior and Design of Metal Structures I	3
Electives	

Second Quarter

Materials Engineering 321–Structural Analysis II	4
Materials Engineering 225–Design of Concrete Structures	4
Electives	

Third Quarter

Materials Engineering 324–Limit Analysis and Design of Structures	4
Materials Engineering 226–Foundation Engineering	3
Electives	

Structural Mechanics

The structural mechanics major acquaints the engineering student with the fundamentals of structural theory on a broad basis. As a result, the engineering graduate with this option takes his place in a wide variety of industries in which structural components of ever-increasing complexity are being used. He may be expected to deal with structural problems involving airplanes, ships, bridges, and spacecraft.

The subjects covered include a thorough introduction to the mechanics of solids as well as structural analysis, vibrations, and experimental stress analysis. In addition to substantial training in mathematics, the student is also expected to complete a major design project in the area of his choice.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	4
Materials Engineering 230–Properties of Materials II	4
Mathematics 220–Elementary Differential Equations I	3
Elective	
Physical education	1

Third Quarter

Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Energy Engineering 201–Thermodynamics	4
Physical education	1

Third Year

First Quarter

Materials Engineering 204–Mechanics of Solids I	4
Mathematics 310–Higher Analysis I	4

Energy 211–Fluid Mechanics 4
Elective

Second Quarter
Materials Engineering 205–Mechanics of Solids II 4
Information Engineering 210–Introduction to Circuit Analysis 5
Electives

Third Quarter
Materials Engineering 206–Mechanics of Solids III 4
Materials Engineering 207–Structural Analysis I 4
Information Engineering 229–Introduction to Electromagnetic Fields 4
Materials Engineering 208–Mechanical Vibrations 4

Fourth Year
First Quarter
Information Engineering 240–Introduction to Electronics 4
Materials Engineering 302–Applied Elasticity I 4
Electives

Second Quarter
Materials Engineering 304–Experimental Stress Analysis 4
Electives

Third Quarter
Materials Engineering 381–Design Project in Structural Mechanics 4
Electives

Systems Analysis

This curriculum provides an introduction to systems engineering and a broad basis for the analysis of complete engineering systems as distinguished from the components of such systems. The systems analysis major requires courses in analysis of lumped and distributed parameter systems, optimization techniques for design, and the theory of automatic control systems. In the analysis courses the student learns to develop and analyze mathematical models of complex engineering systems involving many forms of energy sources and other elements. Such problems are frequently encountered in aerospace, military, and other industrial systems.

Because of the increasing cost, complexity, and critical performance requirements of modern engineering systems the classical tools of design are no longer satisfactory. A design engineer today is faced with not just a design problem to do a particular job, but rather with a problem of designing an optimal system both in the sense of cost and of performance ability. The analog and digital computer methods of analysis and design of systems are given emphasis in this curriculum.

The demand for systems analysts comes from NASA, the Department of

Defense, and many other government agencies. It also comes from communications, computer, aerospace, chemical, and other industries. Many large organizations maintain special departments of systems analysts engaged in research and development to improve existing operations and suggest future endeavors.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 220–Elementary Differential Equations I	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Physical education	1
Third Quarter	
Mathematics 195–Introduction to Automatic Digital Computing	3
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 201–Thermodynamics	4
Information Engineering 210–Introduction to Circuit Analysis	5

Third Year

First Quarter	
Systems Engineering 311–Introduction to Systems Analysis I	4
Energy Engineering 211–Fluid Mechanics	4
Information Engineering 229—Introduction to Electromagnetic Theory	4
Materials Engineering 230–Properties of Materials II	4
Second Quarter	
Systems Engineering 312–Introduction to Systems Analysis II	4
Systems Engineering 321–Distributed Parameter Systems I	4
Information Engineering 240–Introduction to Electronics	4
Third Quarter	
Systems Engineering 313–Introduction to Systems Analysis III	4
Systems Engineering 322–Distributed Parameter Systems II	4
Electives	

Fourth Year

First Quarter	
Systems Engineering 371–Optimization Techniques I	4
Information Engineering 360–Automatic Control Theory I	4
Systems Engineering 323–Distributed Parameter Systems III	4
Electives	
Second Quarter	
Systems Engineering 372–Optimization Techniques II	4
Electives	
Third Quarter	
Electives	

Thermal Science

The major in thermal science offers the student a modern approach to many of the traditional areas of mechanical engineering and provides a broad scientific treatment of engineering research and practice. This major will give students a strong position from which to enter industry, but it is also suited to those who wish to pursue their analytical and experimental interests at the graduate level. The courses required provide both the mathematical background and the physical understanding of fluid mechanics, thermodynamics, and heat transfer for a thorough introduction to the thermal sciences. In the senior year the student may take advantage of the wide scope of the subject to choose an area of specialization. This may be either oriented toward engineering application or arranged to provide an introduction to graduate study.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 195–Introduction to Automatic Digital Computing	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Physical education	1
Third Quarter	
Materials Engineering 103–Engineering Mechanics III	3
Energy Engineering 201–Thermodynamics	4
Mathematics 220–Elementary Differential Equations I	3
Information Engineering 229–Introduction to Electromagnetic Fields	4
Physical education	1

Third Year

First Quarter	
Energy Engineering 211–Fluid Mechanics	4
Energy Engineering 202–Intermediate Thermodynamics	4
Information Engineering 210–Introduction to Circuit Analysis	5
Mathematics 321–Elementary Differential Equations II	3
Second Quarter	
Energy Engineering 221–Heat Transfer	4
Energy Engineering 213–Compressible Flow	4
Information Engineering 240–Introduction to Electronics	4
Materials Engineering 230–Properties of Materials II	4
Third Quarter	
Energy Engineering 214–Viscous Fluid Mechanics	4
Energy Engineering 304–Elementary Transport Phenomena	4
Electives	

Fourth Year

First Quarter	
Energy Engineering 305–Statistical Thermodynamics	4

Energy Engineering 321–Intermediate Heat Transfer 4
Electives

Second Quarter
Energy Engineering 281–Design 5
Electives

Third Quarter
Electives

Water and Air Resources

Water and air resources is concerned with the fluid mechanics of man's environment. The behavior of both the air in the atmosphere and the water on the land and in the oceans is studied. Here the ideas involved are fundamental to such present-day fields of endeavor as the control of air and water pollution. The introduction of this area of study as a major sequence in its own right acknowledges the present-day accent on urban problems. This major sequence combines the basic work in fluid mechanics and thermodynamics with the relevant fields of oceanography and meteorology. The graduate of the program is equipped to enter private industry, state or federal service, or to continue on to graduate study.

Second Year

Second Quarter	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 195–Introduction to Automatic Digital Computing	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Physical education	1
Third Quarter	
Materials Engineering 103–Engineering Mechanics III	3
Mathematics 220–Elementary Differential Equations I	3
Information Engineering 229–Introduction to Electromagnetic Fields	4
Energy Engineering 201–Thermodynamics	4
Physical education	1

Third Year

First Quarter
Energy Engineering 211–Fluid Mechanics 4
Information Engineering 210–Introduction to Circuit Analysis 5
Materials Engineering 230–Properties of Materials II 4
Electives

Second Quarter
Energy Engineering 212–Potential Flow 4
Energy Engineering 214–Viscous Fluid Mechanics 4
Electives

Third Quarter

Energy Engineering 215–Engineering Hydrology	4
Energy Engineering 216–Oceanography	4
Electives	

Fourth Year

First Quarter

Energy Engineering 217–Introduction to Meteorology	4
Energy Engineering 311–Free Surface Flow	4
Electives	

Second Quarter

Energy Engineering 312–Porous Media	4
Energy Engineering 281–Design	4
Electives	

Third Quarter

Energy Engineering 282–Design	
Electives	

Wave Propagation and Radiation

The major in wave propagation and radiation is very similar to that of communications engineering. The significant difference is that the student majoring in wave propagation and radiation must complete, in his senior year, a sequence of courses that concentrate on electrodynamics, microwave device theory, and antennas and radiating systems. This major has the same attributes, with respect to versatility and job opportunities, as the major in communications engineering.

Second Year

Second Quarters	*Hours*
Chemistry 195–Chemistry for Engineers II	4
Materials Engineering 102–Engineering Mechanics II	3
Mathematics 195–Introduction to Automatic Digital Computing	3
Physics 114–General Physics IV (Wave Phenomena and Relativity)	5
Mathematics 220–Elementary Differential Equations I	3
Physical education	1

Third Quarter

Information Engineering 229–Introduction to Electromagnetic Fields	4
Energy Engineering 201–Thermodynamics	4
Materials Engineering 230–Properties of Materials II	4
Information Engineering 210–Introduction to Circuit Analysis	5
Physical education	1

Third Year

First Quarter

Information Engineering 240–Introduction to Electronics	4

Materials Engineering 103–Engineering Mechanics III 3
Energy Engineering 211–Fluid Mechanics 4

Second Quarter
Information Engineering 310–Signal Processing 4
Information Engineering 340–Intermediate Electronics 4
Information Engineering 221–Introductory Electromagnetic Field Theory 3

Third Quarter
Information Engineering 311–Linear Systems Analysis 4
Information Engineering 342–Solid State Electronics 4
Information Engineering 320–Introductory Wave Propagation and Transmission 5
Electives

Fourth Year
First Quarter
Information Engineering 324–Wave Propagation and Radiation I 4
Electives

Second Quarter
Information Engineering 325–Wave Propagation and Radiation II 4
Electives

Third Quarter
Information Engineering 326–Wave Propagation and Radiation III 4
Electives

The College of Liberal Arts and Sciences

Dean B. Doner, Ph.D., Dean of the College
Ellis B. Little, Ed.D., Associate Dean
Willis C. Jackman, M.A., Acting Associate Dean
Vivian C. Lipman, Ph.D., Assistant Dean
Patricia A. McFate, Ph.D., Assistant Dean

The principal objective of the College of Liberal Arts and Sciences is to support and promote the traditions of liberal education and scholarship in its academic and preprofessional programs. Additionally, the College provides service courses for other colleges and programs of professional and preprofessional training.

Curricula Offered by the College

The curricula offered by the College achieve a balance between depth and concentration in a particular discipline and broad exposure to four areas of general education. From one of these areas each student in the general curriculum chooses his major—a subject for intensive study.

He may make his choice to satisfy his intellectual curiosity and to promote his intellectual development, or he may wish to prepare himself for a career in a particular occupation or profession that makes wide use of that field.

Academic Majors

Most of the students in the college choose their major from one of these academic disciplines:

Anthropology
Biology
Chemistry*
Criminal Justice, Administration of
Economics
English
French
Geography
Geology
German
History
Mathematics
Music
Philosophy
Physics*
Political Science
Psychology*
Russian
Sociology
Spanish
Speech

Preprofessional Programs

Students may also register for preprofessional work in one of the following areas. It is important that the student familiarize himself with the specific requirements of the school in which he plans to seek a professional degree.

Premedicine[1]
Predentistry
Preforestry
Preveterinary Medicine
Medical Record Administration
Medical Technology

* Two separate degree programs are offered; consult the department listing.
[1] The premedicine curriculum is a four-year program leading to a bachelor's degree. Students who enroll in this program choose an academic major and complete the usual graduation requirements.
[2] The College of Law of the University of Illinois (at Urbana) requires a degree from an approved undergraduate college; however, this requirement may be waived by special action. Consult the Office of the Dean of the College of Law at Urbana. Some colleges of law admit students who have completed three years of college work. Consult the Office of the Dean of Law of the college in which enrollment is contemplated.

Prelaw[2]
Prepharmacy
Prejournalism
Occupational Therapy
Preprofessional Nursing

Teacher Education

Students who are preparing to teach in secondary schools receive their preparation in special curricula that are supervised by the departments offering the various majors. These programs, which differ in some respects from those leading to a major, lead to a degree that qualifies a student to teach one of the following subjects in a secondary school:

Anthropology
Biological Sciences
Chemistry
English
French
Geography
German
History
Mathematics
Philosophy
Physics
Political Science
Sociology
Spanish
Speech and Theatre

Complete details of the above programs are given under the department listings.

Graduation Requirements of the College

Graduation requirements for the student in the College of Liberal Arts and Sciences are in three categories:

1. All-University requirements (See page 29.)
2. College requirements
3. Department requirements

In addition, there are College restrictions on the courses and hours a student may offer for a degree.

The graduation requirements are explained when the incoming student attends his advisement conference, which is scheduled when he enrolls. At this time, each student also has an opportunity to discuss his educational plans with an adviser who has been appointed by the College.

During his first two years a student in the General Curriculum completes the general education requirements of the College; his College adviser assists him in choosing the sequences and courses required for his degree. When he has earned 67 quarter hours of credit, he chooses a major. Thereafter, he consults the department that offers work in his major when he plans his program. The Catalog, the College *Handbook for Majors and Prospective Majors* and members of the College office staff are also sources of information. Ultimately, however, the student is responsible for meeting the College graduation requirements that were in effect when he entered and for fulfilling the regulations that were in force in his major department when he filed his declaration of a major.

College Requirements

Rhetoric

During his first three quarters in residence a freshman is expected to complete two quarters of rhetoric—Rhetoric 101 and 102. If he does not receive a grade of B or better in Rhetoric 102, he is required to pass a rhetoric qualifying test before he receives his degree.

Foreign Language

A reading knowledge equivalent to that which would result from two years of work begun in college is the basic requirement. It may be fulfilled by completing a sequence in a language in courses numbered 100 through 106 or by placement or by proficiency examination written by arrangement with the department involved. The following rules apply to the foreign language requirement for graduation:

1. If a student presents high school credit for four years in a single language, he takes a foreign language placement test when he enrolls to determine if his high

school work satisfies the graduation requirement. If he needs to take additional courses in the language to complete the requirement, the department will indicate the level at which he begins his college work. If his placement examination indicates he is capable of work beyond the 106 level, he is considered to have satisfied the graduation requirement.

2. The foreign language requirement *must be completed by the end of the junior year.* The sole exception is the transfer student, one admitted to the College with more than 45 quarter hours; he registers for a foreign language every quarter until he has satisfied the graduation requirement.
3. If a transfer student will not be able to complete the foreign language requirement by the time he has earned 135 quarter hours, he may elect a different language but only with the consent of his major department and the approval of the College.
4. Transfer students who present less than two years of college-level work in a foreign language register in the course that next follows their previous college work.
5. Credit is not given for beginning courses in foreign language, the 101-102-103 sequence, unless the full sequence is completed. The above rule governs even though the student has already completed his graduation requirement in one language and is taking courses in a second. When the language is not continued through the 103 level, grades for 101 and/or 102 appear on the student's transcript but are not included in his cumulative graduation average.
6. If a student decides to satisfy the foreign language requirement by taking further work in a language studied in high school, the placement test recommendation determines the courses in which he may register. He may not take a course lower than that recommended by the department. If he wishes to enroll on no-credit status, the department and the College must approve.
7. The department recommends enrollment in beginning language courses on the basis of the high school units the student presents in a language:

   One high school unit—A 101 course may be taken for credit.
   Two high school units—A 102 course may be taken for credit.
   Three high school units—A 103 course may be taken for credit.
   Four high school units—A 104 course may be taken for credit.
8. Courses in a foreign language may be audited only with the written permission of the department and the College office.
9. Students whose performance on the placement test indicates assignment to a more advanced course than would normally be expected may receive some college credit. See the Liberal Arts and Sciences *Handbook for Majors and Prospective Majors* for details.

General Education Sequences

The general education program introduces the student to four areas—biological sciences, physical sciences, humanities, and social sciences. A student may not fulfill more than one of his sequences in a single department. The student's major automatically satisfies one sequence; a course taken to satisfy the requirements for a minor may not be additionally offered to fulfill a general education requirement.

These sequences may be used to satisfy the College of Liberal Arts and Sciences general education graduation requirement.

Biological Sciences

BioS. 100, 101, 102

Humanities

Engl. 101, 102, 103
150, 151, 152

Hist. 131, 132, 133
111, 112, and either
110 or 113

Hum. 101, 102, 103
106, 107, 108
151, 152, 153

Fr. 201, 202, 203

Ger. 3 courses in literature
in 200 courses or above
(one may be in translation) †

Span. 240, 241, 242*
221, 222, 223*

Fr. 216, Ger. 216, Span. 240 or 241*

Mus. 130, 131, 132 and one
course from Mus. 215,
216, or 217

Phil. 101, 102, 103
201, 203, and one
additional course.

Spch. 121, 122, 123

Physical Sciences

Chem. 112, 113, 114
113, 114, 121
117, 118, 119

Geog. 101, 102, 103

Geol. 101, 102, 103

Math. 115, 116, 117
12 hours in 110 and above

PSci. 101, 102, 103

Phys. 101, 102, 103

Social Sciences

Anth. 102, 103, 104
One of Anth. 102, 103
104 and Soc. 100,
Psch. 100

Geog. 104, 105, 114
104, 105, 123
375, 377 (acceptable as
a full sequence)

Hist. 111, 112 and either
110 or 113
151, 152, 153

PolS. 150, 151, and any other
200-level course in the
department except 299

Psch. 100 or 102, and any 100-level
course, plus any 200-level
course–a total of three
courses

Soc. 100, 130, 131
100 and two 100-level
anthropology courses

Spch. 111, 112, 113

†10-12 hours acceptable in this sequence.
*These 8 to 11 hour upper level course sequences are exceptions to the general requirement of 12-hour sequences.

Transfer Credit in General Education

If a transfer student has not completed comparable sequences elsewhere, he is required to satisfy the general education patterns listed below.

	Additional Requirement
6 semester hours of humanities survey or 6 additional hours of humanities in sequence	Any course in any field of the humanities
6 semester hours of social science survey or 6 other hours of social science in sequence	Any course in any field of the social sciences
6 semester hours of biology	Any one of BioS. 100, 101, 102
6 semester hours of physical science	One course in a physical science
3 semester hours of biology	Any two of BioS. 100, 101, 102
3 semester hours of physical science survey	Two courses in physical science
3 semester hours of humanities survey	Two courses in sequence in humanities
3 semester hours of social science survey	Two courses in sequence in social science

The Major

When he has earned 67 hours in the College, a student selects a field of specialization—his major. Consult the department listings for the majors and the requirements therefor. At least 12 hours of the major must be taken in upper division courses while the student is in residence.

The Minor(s)

In consultation with the adviser of the department in which he has chosen his major, a student selects one or two minors. At least 9 hours of a single minor or half of the hours in each of the areas of a split minor must be taken in residence.

A minimum of 18 hours in one minor field or 12 hours in two minor fields are required. No more than 30 hours will be required in either case. The same course may not be used to satisfy both a minor requirement and a general education requirement.

Note: Some departments require a portion of the minor to be presented in advanced-hour courses.

Advanced Hours

Of the 180 quarter hours (excluding basic military science and required physical education courses) that a student is required to earn for a degree, at least 45 hours must be in 200-level or 300-level courses, taken after a student achieves junior standing, that is, after he has earned 90 or more quarter hours.

Department Requirements

In addition to the courses and number of hours in the major and minor fields, the major department may require or recommend supplementary work outside the major and minor fields. Consult the department listings.

Limitations on Courses and Hours

Independent Study. No more than 18 hours of credit in courses titled "Independent Study" or "Independent Research" may be offered toward the degree.

Electives. Any course offered in the College of Liberal Arts and Sciences that is not required for the student's degree may be used as a free elective.

Electives taken outside the College must be approved by the department in which the student is fulfilling his major and by the College if they are to be counted in the total hours presented for the degree.

Hours in Courses Taken Outside the College. No more than 48 hours of credit in courses taken outside the College may be counted toward the degree unless the student is majoring or minoring in economics or has the approval of both the Dean of Liberal Arts and Sciences and the department in which he is fulfilling his major.

The General Curriculum and the Teacher Education Curricula for Teaching in Secondary Schools

The General Curriculum of the College provides the framework within which the majority of Liberal Arts and Sciences students complete the courses required for the degree of Bachelor of Arts.

The teacher education curricula offer programs, leading to the baccalaureate degree and to certification at the secondary level, in the Departments of Anthropology, Biological Sciences, Chemistry, English, French, Geography, German, History, Mathematics, Philosophy, Physics, Political Science, Sociology, Spanish, and Speech and Theatre. The teacher education student must meet all of the general college requirements for graduation and must select a major field on admission to the program at the beginning of his junior year. In consultation with his adviser for his major he may also choose a minor field. Specific course requirements for teacher education majors and minors are listed under the departments. In addition to these requirements, all students in all secondary education curricula must complete Psychology 100, Political Science 151, and Education 170, 210, 250, and 270.

To register for a teacher education curriculum a student must have at least a 3.500 average at the end of his sophomore year.

The requirements for the major and the minor in the General Curriculum and the requirements for the major and the minor areas of specialization for those preparing to teach in secondary schools follow.

See also Illinois State Teachers Certificate Requirements, page 95.

The Administration of Criminal Justice

Associate Professors
Arthur J. Bilek, M.S.W., Director of the Curriculum

Assistant Professors
Joseph D. Nicol, M.S.; Stephen A. Schiller, J.D.

The degree of Bachelor of Arts is awarded students who fulfill the general University requirements, the college graduation requirements, and successfully complete this program in the College of Liberal Arts and Sciences.

The program is designed for students planning a career or graduate study in law enforcement, police administration, criminal law, corrections, criminalistics, probation and parole, criminology or delinquency. Regular undergraduates and persons presently working in police and correction agencies may enroll.

180 hours, exclusive of basic military science and required physical education, distributed as follows:

Rhetoric 101, 102	8 hours
Foreign language (one)	24*
Biological sciences	12
Humanities	12
Physical science	12
Social sciences	40-41

* Or the equivalent of two college years in one language.

Sociology 100, 131, 225, 276
Political Science 150, 151, 205
Psychology 100, 110
Sociology 185 or Psychology 243

Criminal Justice Core	17 hours
Criminal Justice 251, 252, 351, 352, 353	
Criminal Justice specialization, from one or more of the following areas: law enforcement, criminology, corrections, criminal justice, science and technology	8 or more
Minor, 18 hours if taken in one field or 24 hours if taken in two	18-24
Electives	24-29

Economics

A degree program in economics is administered by the College of Liberal Arts and Sciences.

Major—for the degree of Bachelor of Arts, in Liberal Arts and Sciences, a minimum of 32 hours, including:

Econ. 120, 121, 320, 321
From 16 to 20 hours (with no more than 8 hours from any one) from:
Area 1—Econ. 324, 325, 326
Area 2—Econ. 333, 334, 335
Area 3—Econ. 327, 328, 329, 330
331, 332, 398, 399
Fin. 340
Math. 110, 111, 112, or their equivalents
QM 170, 171, 172

Minor—18 hours in one department, chosen in consultation with the departmental adviser, or 24 hours in two departments.

Anthropology

Professors

Charles A. Reed, Ph.D., Acting Head of the Department

Associate Professors

Laura A. Bohannan, Ph.D.; William A. Shack, Ph.D.

Assistant Professors

Constance E. Cronin, Ph.D.; Susan T. Freeman, Ph.D.; Merwyn S. Garbarino, Ph.D.; Robert C. Hunt, Jr., Ph.D.; Charles P. Warren, M.A.

Major—for degree of Bachelor of Arts, 40 hours, distributed as follows:

Anth. 102, 103, 104, and 273, or substitutes satisfactory to the department.

8 hours of advanced courses in archaeology and human evolution (a course in archaeology used to satisfy this requirement can not also be used as a part of the requirement for the following item).

8 hours from one of the following sets: 251, 264; or 363, 368; or 266, 361; or 263, 390, 391.

8 hours selected in consultation with the student's departmental adviser. Each major is assigned a departmental adviser.

Departmental Distinction: A candidate must be eligible for College Honors, must meet all the requirements for a major in anthropology, and must satisfactorily complete a thesis during Anthropology 299. A student who elects a minor in anthropology may also, with the consent of the department, be awarded distinction upon satisfactory completion of Anthropology 299.

Minor—24 hours in one field or at least 16 hours in each of two fields, chosen in consultation with the departmental adviser.

Biological Sciences

Professors

John O. Corliss, Ph.D., Head of the Department; Sidney F. Glassman, Ph.D.; Bernard Greenberg, Ph.D.; Kenneth A. Madison, Ph.D.; Charles A. Reed, Ph.D.; Albert S. Rouffa, Ph.D.; William Sangster, Ph.D.; Max C. Shank, Ph.D.; Rolf Singer, Ph.D.; Eliot B. Spiess, Ph.D.

Associate Professors

Helene N. Guttman, Ph.D.; Elmer B. Hadley, Ph.D.; Ellis B. Little, Ed.D.; Halina J. Presley, Ph.D.; David Shomay, Ph.D.; Robert B. Willey, Ph.D.

Assistant Professors

David Bardack, Ph.D.; James A. Bond, Ph.D.; Howard E. Buhse, Jr., Ph.D.; Manuel A. Goldman, Ph.D.; Jacques Kagan, Ph.D.; Donald A. Levin, Ph.D.; Darrel L. Murray, Ph.D.; John A. Nicolette, Ph.D.; Thomas N. Taylor, Ph.D.; Ruth L. Willey, Ph.D.

Instructors

R. Satish Chandran, Ph.D.; Elizabeth Deis, M.S.; Richard B. Farrar, Jr., B.S.; Leonard Feigenbaum, Ph.D.; Harold W. Kerster, B.S.; Sue Y. Lee, Ph.D.; Marlen F. Mahoney, M.A.; Barbara G. McCormick, M.S.; Paul J. Taxey, M.A.; Phebe VanValen, Ph.D.; Marvalee H. Wake, M.S.

Assistants

James L. Beug, B.A.; Martha Blake, M.A.; Sheila D. Brack, B.A.; Diane Chambliss, B.A.; Andrew D. Cohen, M.S.; James A. Diez, B.A.; Ruthanna M. Dyer, B.A.; Jerry H. Fogelson, B.A.; David G. Ford, B.S.; Charles J. Graber, B.A.; Robert C. Holsen, Jr., B.A.; Charles F. Huettner, B.S.; Elizabeth B. Juergensmeyer, Ph.D.; Ahmad Kamal, M.A., M.S.; Katherine Keenan, M.S.; Morris Levy, B.S.; Jaclin S. Lewbin, B.A.; Stephen R. Mack, B.S.; Rosemary A. Marone, B.S.; Leilani H. Miller, B.A.; Mary Morgenstern, B.S.; Robert Rosen, B.S.; Gar W. Rothwell, B.A.; Harris Rubin, B.S.; John D. Staudinger, M.S.; Mohammed Younus, M.S.; Donald Zwigoff, B.A.

Research Associates

Luretta Spiess, Ph.D.

Research Assistants

Kenneth R. Groh, B.S.; Dorothy J. Howell, M.S.; Richard N. Sherwin, M.S.; Ellen S. Vitetta, M.S.; Joyce R. Wille, B.S.; Tina H. Yacher, B.S.

Major—for degree of Bachelor of Science, 30 hours (exclusive of all 100-level courses), distributed as follows:

BioS. 210 or 211, 240, 261
300, 315, 324 or 380, 345
One from 230, 232, 280
313, 319, 333, 384, 388, 389

Physics—3 quarters

Chemistry—3 quarters (including organic)

Credit in Math. 130 or equivalent (calculus and/or statistics highly recommended

Biological sciences majors are assigned a departmental adviser.

Departmental Distinction: A candidate must perform creditably in BioS. 299, Individual Topics, and must pass a comprehensive examination administered by the department if he is to be considered for departmental distinction.

Minor—30 hours in one or two departments of the College of Liberal Arts and Sciences. At least 12 hours must be taken in each department if two are chosen.

Note: A course may not be counted toward both the major and the minor.

Teacher Education in Biological Sciences: Requirements for Teaching in Secondary Schools

Major field of specialization—48 to 50 hours, distributed as follows:
BioS. 100, 101, 102
210 or 211, 240, 261
300, 307, 315, 324 or 380, 345
One course from 230, 232, 280
313, 319, 333, 384, 388, 389
Three quarters of physics
Three quarters of chemistry (including organic)
Three quarters of mathematics
(calculus and/or statistics highly recommended)
Electives: 6 to 8 hours in biological sciences
(to provide a balance between plant and animal biology)

Minor field of specialization—33 hours distributed as follows:
BioS. 100, 101, 102
21 hours from 200 and 300-level biological sciences courses

Chemistry

Professors

William F. Sager, Ph.D., Head of the Department; Bernard J. Babler, Ph.D., Executive Secretary; Joseph H. Boyer, Ph.D.; Ferris B. Crum, Ph.D. (Emeritus); Roy Huitema, Ph.D.; Charles K. Hunt, Ph.D.; Jan Rocek, Ph.D.

Associate Professors

Thomas H. Brown, Ph.D.; Richard L. Carlin, Ph.D.; Chui Fan Liu, Ph.D.; J. Victor Mansfield, Ph.D.; Robert L. Miller, Ph.D.; Hans T. Mueller, Ph.D. (Emeritus); Samuel Schrage, Ph.D.

Assistant Professors

Ronald J. Baumgarten, Ph.D.; Richard P. Burns, Ph.D.; Dolan H. Eargle, Jr., Ph.D.; Anatol Gottlieb, *T.Sc.D.*; Jacques Kagan, Ph.D.; Rosalind A. Klaas, Ph.D.; Florence C. Klee, Ph.D.; Leonard Kotin, Ph.D.; Raymond P. Lutz, Ph.D.; Caroline D. Miller, Ph.D.; Yecheskel Rasiel, Ph.D.; Edward G. Rietz, Ph.D.; George I. Sackheim, M.S.; Tsu-chia Shieh, Ph.D.; John F. Steiner, Ph.D.; Milton Yusem, Ph.D.

Instructors

Ajaya K. Awasthy, Ph.D.; Doris C. Blumenthal, M.S.; James Bundschuh, Ph.D.; John W. Cowin, M.A.; Harry J. Delfs, M.S.; Shafeek Farag, M.A.; Wade Freeman, Ph.D.; Morris Goran, Ph.D.; Elaine Z. Herzog, M.A.; Fred E. Kasner, Ph.D.; Thomas A. Lothian, M.A.; Ralph E. Meints, Ph.D.; Paul Mueller, Ph.D.; Clarence J. Perry, M.Ed.; Barbara F. Pilkey, M.S.; Sylvester J. Potempa, M.S.; Alfred B. Pulin, B.S.; Lillian M. Questiaux, Ph.D.; Aparna Rahman, M.S.; Matiur Rahman, Ph.D.; Herbert Rosing, M.S.; Michael G. Savoy, M.S.; Frances K. Seabright, M.S.; Jack Sosinsky, Ph.D.; John E. Spikner, M.S.; Robert E. Zahrobsky, Ph.D.

Assistants

David E. Aylward, B.A.; Mir Ali, B.S.; Howard Blaz, B.S.; Sidney Bosen, B.S.; Listan Chang, B.S.; Shaw-an Cheng, B.S.; Phillip DeChristopher, B.S.; Jane Dooley, B.S.; Joseph C. Drozd, B.S.; Arthur F. Eidson, B.S.; Edward M. Fashing, B.S.; Mary E. Foss, B.S.; Paul Frints, B.S.; Khe Kho, B.S.; Chiu-Sheung Ng, B.S.; Lorain Nicholls, B.S.; Walter J. Pravica, B.S.; James T. Przybytek, B.S.; Robert Schwartz, B.S.; Arthur Siegel, B.S.

Postdoctoral Fellows: Research Associates

William E. Krueger, Ph.D.; Gerard J. Mikol, Ph.D.; Radhakrishnan Selvarajan, Ph.D.; Robert E. Tapscott, Ph.D.; Myo K. Yoo, Ph.D.

Major—for the degree of Bachelor of Arts, 36 hours*, distributed as follows[1]:

Chem. 119 or 121
233, 234, 235, 237, 282
340, 341, 342, 343, 344, 345

Chemistry majors are assigned a departmental adviser.

Departmental Distinction: To be considered for departmental distinction a candidate must perform creditably in all required advanced hours. For specific requirements consult the executive secretary of the department at least two quarters before graduation.

Minor—30 hours, chosen in consultation with the departmental adviser, in one or two areas. (See also Chemistry Curriculum.)

Teacher Education in Chemistry: Requirements for Teaching in Secondary Schools[1, 2]

Major—48 hours*, distributed as follows:

Chem. 112, 113, 114, 121
233, 234, 235, 285
340, 341, 342, 343, 344, 345

Minor (second field of specialization)—30-36 hours

Chem. 112, 113, 114, 121
233, 234, 235
Chemistry electives: 0-6 hours

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* Subject to approval by the Chicago Circle Senate, the Board of Trustees, and the State Board of Higher Education.

[1] Chem. 340 through 345 may be replaced by 380, 382, 383, and 8 additional hours of approved 300-level courses if the Department of Chemistry so recommends.

[2] Chem. 112, 113, 114, 121 may be replaced by 117, 118, 119, if the Department of Chemistry so recommends.

Supporting Courses—39 hours

Math. 130, 131, 132, 133
Phys. 111, 112, 113, 114

Science *electives* must be chosen in consultation with the adviser.

The Chemistry Curriculum

The degree of Bachelor of Science in Chemistry is awarded students who successfully complete this curriculum in the College of Liberal Arts and Sciences. This course of study satisfies all of the requirements set by the American Chemical Society for professional accreditation.

192 hours*, exclusive of physical education and basic military science. Prerequisites for Chemistry 340 must be fulfilled before the fall quarter of the student's junior year.

Rhetoric 101, 102	8 hours
German or Russian[1]	0-24
Humanities	12
Social Science	12
Mathematics 130, 131, 132, 133	20
Physics 111, 112, 113	14
Chemistry 117[2], 118, 119	15
233, 234, 235, 237	15
340, 342, 344, 347	13
341, 343, 345	6
315, 321, 322	11
Other approved 300-level courses	3
Advanced natural science and/or mathematics electives approved by the adviser	20
Electives	17-41

* Subject to approval by the Chicago Circle Senate, the Board of Trustees, and the State Board of Higher Education.

[1] The equivalent of two years, in a single language, at the college-level; French may be accepted; consult the Department of Chemistry.

[2] Chem. 117, 118, 119 may be replaced by 112, 113, 114, and 121 if the Department of Chemistry so recommends.

English

Professors

Robert B. Ogle, Ph.D., Head of the Department; Bernard R. Kogan, Ph.D., Executive Secretary; Arna Bontemps, M.A.; Alfred P. Dorjahn, Ph.D. (Visiting; Classics); Falk S. Johnson, Ph.D.; Clara Kirk, Ph.D. (Visiting); Rudolf Kirk, Ph.D. (Visiting); Louis Marder, Ph.D.; Ralph J. Mills, Jr., Ph.D.; John F. Nims, Ph.D.; Harry J. Runyan, Ph.D.; Andrew Schiller, Ph.D.; Karl Shapiro, D.H.L.; James B. Stronks, Ph.D.; Eugene B. Vest, Ph.D.; Samuel A. Weiss, Ph.D.; Elizabeth V. Wright, Ph.D.

Associate Professors

Irving D. Blum, Ph.D.; Guinevere L. Griest, Ph.D.; John C. Johnson, Ph.D.; Moreen C. Jordan, Ph.D.; Alexander Karanikas, Ph.D.; Zelma B. Leonhard, Ph.D. (Emerita); Edwin B. Levine, Ph.D. (Classics); Sonia Miller, Ph.D.; John B. Shipley, Ph.D.

Assistant Professors

Norman R. Atwood, Ph.D.; Donald E. Billiar, Ph.D.; Laura E. Casari, Ph.D.; William E. Doherty, Ph.D.; Beverly Fields, Ph.D.; Robert W. Gladish, Ph.D.; Edith Gold, Ph.D.; Hymen H. Hart, Ph.D.; Edward F. Heuston, Ph.D.; Willis C. Jackman, M.A.; Gerald B. Kauvar, Ph.D.; Laurette A. Kirstein, M.A.; Robert J. Kispert, Ph.D.; David S. Lenfest, Ph.D.; W. Nell Love, Ph.D.; John H. Mackin, Ph.D.; Patricia A. McFate, Ph.D.; Adam Makkai, Ph.D.; Valerie Makkai, Ph.D.; Irving Miller, Ph.D.; Michael Morrisroe, Jr., Ph.D.; Margaret H. Oleksy, M.A.; Ted-Larry Pebworth, Ph.D.; A. Lavonne Ruoff, Ph.D.; James Russell, Ph.D.; Catherine Shaw, Ph.D.; Gerald C. Sorensen, Ph.D.; Morris Star, Ph.D.; Mary Thale, Ph.D.; Robert L. Vales, Ph.D.; Maurita Willett, Ph.D.

Instructors

Annie Aubrey, M.A.; Harry K. Baum, M.A. (Classics); Kenneth E. Bidle, M.S.; Shirlee M. Blumenthal, M.A.; Preston M. Browning, M.A.; Melvin H. Buxbaum, M.A.; Archibald J. Byrne, M.A.; Kathryn H. Carlson, M.A.; Robert L. Carter, Jr., M.A. (Classics); Rolf H. Charlston, M.A.; Nancy R. Cirillo, M.A.; Sarah B. Cohen, M.A.; F. Gaylord Cox, M.A.; Russell E. Davis, M.A.; Lloyd E. Dodd, M.A.; John P. Fludas, M.A.; Beverly M. Friend, M.A.; Allen D. Goldhamer, M.A.; Arthur L. Greenwald, M.A.; Laila Gross, M.A.; Eleanor K. Harris, M.A.; Dale S. Herron, M.A.; Lucy Hegie, M.A. (Emerita); Florence R. Jones, M.A.; Dolores L. Keranen, M.A.; Howard H. Kerr, M.A.; Marion S. Kerwick, M.A. (Emerita); Narvell Lane, M.A.; Theodore W. Loeppert, M.A.; John A. Lopach, M.A.; Vincent Louthan, B.A.; Ronald J. McCaig, M.A.; Horace C. Merten, M.A. (Emeritus); Sara C. Niederman, M.A. (Emerita); Anne Phillips, M.A.; James L. Rauch, M.A. (Classics); Mary V. Reed, M.A.; Eyvind C. Ronquist, M.A.; Sondra Rosenberg, M.A.; Michael A. Rudick, M.A.; Cecilia M. Rudin, M.A.; Gene W. Ruoff, M.S.; Constantine Santas, M.A.; Joseph W. Schellhardt, M.A.; Marie J. Secor, M.A.; Mary C. Sidney, M.A.; Stuart J. Silverman, M.A.; Diane E. Smith, M.A.; Frederick C. Stern, M.A.; Robert E. Terrill, M.A.; Beatrice S. Timmis, M.A. (Emerita); Charles A. Weisbrod, M.A. (Classics); Thomas Weisshaus, M.A.; Dorothy E. Welker, Ph.D.; Dale E. Woolley, M.A.; Anthony C. Yu, M.A.

Teaching Assistants

Susan Barasch, M.A.; Carole M. Barton, M.A.; Ann E. Colley, M.A.; Brian Corman, M.A.; Mary D. Ellickson, M.A.; Bertram Enos, M.A.; Geraldine Gyarfas, M.A.; Steven R. Loevy, M.A.; Jane D. Novak, M.A.; Nancy Parra, M.A.; James M. Rainey, M.A.; Ellen Siegal, B.A.; Jeffrey P. Szanto, M.A.; Geraldine Van Doren, M.A.; Carol Walker, M.A.; Anita E. Weisbrod, M.A.; Joseph E. Woods, M.A.

Research Assistants

Elias C. Argott, B.A.; Mary A. Carroll, B.A.; Douglas Casement, B.A.; Judith Guttenberg, B.A.; Rita Harris, B.A.; Ann H. Joel, B.A.

Lecturers

Edward Aronson, M.A.; Cecil M. Brown, M.A.; Donald D. Choice, M.A.

Major—for the degree of Bachelor of Arts, 36 hours, including the following:

Specialization in American Literature

Engl. 231 or 232, 255, 256, 257, 301, 334, 335
4 hours from 310, 350, 355, 386, 389
4 hours from 288, 316, 375, 376, 377, 380, 388, 392, 393, 394

Specialization in English Literature

Engl. 231 or 232, 301, 334, 335
4 hours from *each* of the following:
American literature
English literature prior to 1660
English literature from 1660 to 1800
English literature from 1800 to 1900
English literature of the twentieth century

Note: 100-level courses in English do not count toward the major. English 150, 151, 152 (survey of English literature), taken in sequence, are prerequisites for all 200-level and 300-level courses in English for the major.

Departmental Distinction: A grade of A or B in English 298, three senior honors seminars.

Senior honors seminars are open to students of superior ability and achievement. Admission is by application to and with the approval of the department.

Superior freshmen may participate in the freshman honors program by invitation.

Minor—20 hours in one subject,* with at least 8 quarter hours on the 200- or 300-level; or 24 hours in two subjects, with a minimum of 12 hours in each, with 8 hours on the 200- or 300-level in each. The requirement of 8 quarter hours on the 200- or 300-level does not apply to students electing a foreign language as their minor. The minor or minors are to be selected by the student in consultation with an adviser from the English department.

Note: Courses taken in fulfillment of a general education requirement may not be used for the minor.

Teacher Education in English: Requirements for Teaching in Secondary Schools

Major—52 hours
Rhet. 133, 246
Engl. 231, 150, 151, 152, 210, 255, 256, 257, 301, 334, any 200- or 300-level course in English. (English 111 is recommended for prospective teachers in the Chicago school system.)

Minor—32 hours
Rhet. 133, 246
Engl. 150, 151, 152 255, 256, 257

* Subject to approval by the Chicago Circle Senate, the Board of Trustees, and the State Board of Higher Education.

French

Professors

William M. Schuyler, Ph.D., Head of the Department.

Associate Professors

Marie E. Lein, Ph.D.; Charles M. Lombard, Ph.D.; Dorothy R. Thelander, Ph.D.

Assistant Professors

David E. Campbell, Ph.D.; Priscilla P. Clark, Ph.D.; Edna S. Epstein, Ph.D.; Byron R. Libhart, Ph.D.; Kenneth I. Perry, Ph.D.; Yvonne B. Weinstein, *Diplôme d' Etudes Supérieures.*

Instructors

Raymond M. Archer, M.A.; Dorothy G. Barber, M.A.; Janet Eisenberg, M. A.;

Norman J. Gritz, M.A.; Colette R. Hopkins, M.A.; Douglas E. Johnson, M.A.; Ruta O. Lukas, M.A.; Sylvia Patlogan, M.A.; Henry B. Russell, M.A.; Clara S. Skogen, M.A.; Nancy A. Tomasek, M.A.

Major—for the degree of Bachelor of Arts, a minimum of 40 hours (excluding French 101, 102, 103, 104, 105, 106, 113, and 216) including the following:

Fr. 201, 202, 203, 209, 210, 211

18 hours of 300-level courses, including 313 or 314

It is recommended that French majors take one year of English literature and one year of European history.

Departmental Distinction: Recommendation is based on 4.500 average in all courses counted for the major and a grade of A on the departmental comprehensive examination required of all French majors.

Minor—30 hours, chosen in consultation with the departmental adviser, in not more than two subjects, with at least 12 in each if two are chosen. Minors outside the College must also have the adviser's approval.

Teacher Education in French: Requirements for Teaching in Secondary Schools

Major—39 hours
Fr. 201, 202, 203
209, 210, 211
282
18 hours of 300-level courses including 313 or 314

Minor—30 hours
Fr. 104, 105, 106
201, 202, 203
209, 210, 211
282 is recommended

Note: Fr. 101, 102, 103, 104, 105, 106, 113 and 216 are excluded from the major.

Geography

Professors

Alden D. Cutshall, Ph.D., Head of the Department; William L. Garrison, Ph.D.; Edwin N. Thomas, Ph.D.

Associate Professors

Mary M. Colby, Ph.D. (Emerita); Edwin H. Draine, Ph.D.; Mildred I. Finney, Ph.D.,

Assistant Professors

James S. Fisher, Ph.D.; Roger M. McCoy, Ph.D.; David M. Solzman, Ph.D.; Clifford E. Tiedemann, Ph.D.

Instructors

Rachel P. Fitch, M.S.; Kenneth L. Kartz, M.A.; Albert J. Larson, M.A.; Donald F. Stetzer, M.A.

Assistants
Burton A. Kessler, M.S.; Nan K. Priggie, M.A.

Visiting Lecturers
David R. Scott, M.A.

Major—for the degree of Bachelor of Arts, 45 hours, at least 20 of which must be in upper level courses, distributed as follows:

3 courses in physical geography (may be met by a physical science sequence in geology together with Geography 102 and 103)
2 courses in regional geography, including Geography 221
2 upper-level systematic courses, exclusive of those in physical geography
Geography 351 or 355

Geography majors are assigned a departmental adviser.

Departmental Distinction: Consult the departmental adviser. Enrollment in Geography 391 and eligibility for graduation with honors in Liberal Arts and Sciences.

Minor—30 hours in two departments related to the student's special interest or objectives or in an approved interdepartmental program, with at least 12 hours in each field, and at least 4 hours in 200-level, or higher, courses.

Teacher Education in Geography: Requirements for Teaching in Secondary Schools

Major—48 hours
Geog. 101, 102, 103
104, 109, 114, 221, and 19 additional hours of 200-level courses, including at least one additional regional course
Electives: 10-34 hours.

Minor—35 hours
Geog. 101, 102, 103
104, 109, 221 and 10 additional hours of 200-level courses including one additional regional course.

Geology

Werner H. Baur, *Dr.rer.nat.*, Head of the Department.

Professors
Robert W. Karpinski, *D.es.Sc.*

Associate Professors
Werner H. Baur, *Dr.rer.nat.;* Robert DeMar, Ph.D.

Assistant Professors
Warren C. Forbes, Jr., Ph.D.; Abraham Lerman, Ph.D.; Kelvin S. Rodolfo, Ph.D.; Norman D. Smith, Ph.D.

Instructors
James B. Orr, M.S.; Walter B. Roe, M.S.

Assistants
August Pivorunas, B.S.

Major—for degree of Bachelor of Science, 30 hours excluding Geology 101, 102, 103, 150. In addition either Phys. 101, 102, 103, or 111, 112, 113, 114 are required.

The Geology 101, 102, 103 sequence is not required as part of the major. If that sequence is not taken, the major (30 hours in geology) must be augmented by two 200 or 300-level 4 hour courses chosen with the approval of the departmental adviser. These must be selected from physics, chemistry, biological sciences, engineering, geography, or mathematics.

A suitable field course chosen in consultation with the departmental adviser, is usually required. A maximum of 4 hours in field courses is allowed as credit toward the major.

With departmental approval, advanced work in a related subject may be substituted for 6 hours of geology. Geology majors are assigned a departmental adviser.

Departmental Distinction: A grade of A in Geol. 299, an acceptable thesis, and an overall grade-point average of 4.000 or better (exclusive of military science and physical education), depending upon the level of distinction sought are required for recommendation for departmental distinction.

Minor—The following courses are required:
Math. 131, 132, 133
Chem. 117, 118, 119 or 112, 113, 114

German

Professors
Robert R. Heitner, Ph.D., Head of the Department; Robert Kauf, Ph.D.; Daniel C. McCluney, Jr., Ph.D.; Hazel C. Vardaman, Ph.D.

Associate Professors
Arnold J. Hartoch, Ph.D.; Bruno F. Hildebrandt, Ph.D.; Wulf Köpke, Ph.D.; Elizabeth Teichman, Ph.D.; Ernest S. Willner, Ph.D.

Assistant Professors
James C. Hanson, Ph.D.; Daniel G. Harrington, M.A.; Karl F. Otto, Jr., Ph.D.

Instructors
Johanna Braunfeld, M.A. (Emerita); Dean W. Faulwell, M.A.; Gertrude E. Grisham, M.A.; Arthur E. Haase, M.A.; Lieselotte M. Hildebrandt, M.A.; Wilma Hoffman, M.A.; Olga M. Koenig, M.A.; Maurice F. Meyers, M.A.; Thomas M. Pool, M.A.; Rimvydas

Sliazas, M.A.; Wanda L. Sorgente, M.A.; Susan E. Spruth, M.A.; Ingrid K. Welch, M. A.; Diana L. Westgate, M.A.; Dennis S. Whelan, A.B.

Major—for the degree of Bachelor of Arts, 42 hours in 200-level courses or above (exclusive of courses given in translation, and German 331), including:

Ger. 201, 202, 203, 221, 290
292, 294, 301, 305 and
8 hours of additional 300-level courses

Note: Ger. 101, 102, 103, 104, 105, 106, 108, 109, 113, 114, 115, 121, 122, 123, 134, 135, 136 are excluded from the major.

Honors—Students who wish to be recommended for honors must also complete German 350, 351.

Minor—18 hours, chosen in consultation with the departmental adviser, in courses from one other department or 24 hours from two departments.

Teacher Education in German: Requirements for Teaching in Secondary Schools

Major—45 hours*
Ger. 201, 202, 203, 204, 220
221, 290, 292
294, 301, 305, 331, and
4 additional hours selected
from 302, 385, 396

Minor—30 hours
Ger. 104, 105, 106
201, 202, 203
and 6 additional hours selected
from 220, 221, 301, 305

* Subject to approval by the Chicago Circle Senate, the Board of Trustees, and the State Board of Higher Education.

History

Professors

Robert V. Remini, Ph.D., Chairman of the Department; Shirley A. Bill, Ph.D.; Louis Gottschalk, Ph.D. (Visiting); Stanley L. Jones, Ph.D.; Robert L. Nicholson, Ph.D.; Donald W. Riddle, Ph.D. (Emeritus); Max Savelle, Ph.D. (Visiting); William R. Taylor, Ph.D. (Visiting); John B. Wolf, Ph.D.

Associate Professors

Peter J. Coleman, Ph.D.; Carolyn A. Edie, Ph.D.; John G. Gagliardo, Ph.D.; Margaret Y. George, Ph.D.; Bentley B. Gilbert, Ph.D.; Robert L. Hess, Ph.D.; Richard Millman, Ph.D.; Gilbert Osofsky, Ph.D.; Louis Unfer, Ph.D. (Emeritus).

Assistant Professors

Burton J. Bledstein, Ph.D.; Robert E. Conrad, Ph.D.; Mary E. Conroy, Ph.D.; Gerald A. Danzer, Ph.D.; Arthur Donovan, Ph.D.; Robert A. Friedlander, Ph.D.; Melvin G. Holli, Ph.D.; George Huppert, Ph.D.; Ronald P. Legon, Ph.D.; Kenneth A. Lockridge, Ph.D.; Peter R. McKeon, Ph.D.; Marion Miller, Ph.D. (Visiting); Karl A. Schleunes, Ph.D.; C. David Tompkins, Ph.D.

Instructors

Joan M. Coppleson, M.A.; Donald J. Klimovich, M.A.

Assistants

Richard B. Bingham, M.A.; Robert W. Carden, M.A.; Marvin Ciporen, M.A.; Perry R. Duis, M.A.; Beverly V. Gay, M.A.; Morton E. Goldstein, M.A.; Paul M. Green, M.A.; Eric P. Groon, M.A.; Lee E. Grugel, M.A.; Norman M. Klein, M.A., Donald S. Lamesch, M.A.; Edward H. Mazur, M.A.; George L. Mitchell, M.A.; Gerald M. Oppenheimer, M.A.; Richard E. Schroeder, M.A.; Basya G. Segal, M.A.; Jerome L. Stoker, M.A.; R. David Weber, M.A.

Major—for the degree of Bachelor of Arts, 45 hours, distributed as follows:

100-level courses	9 hours (maximum)
200 and 300-level courses:	
United States history	9-12
European history since 1450	9-12
A third field of history	9-12

All majors are assigned a departmental adviser.

Departmental Distinction: A 4.500 all-University average and a 4.750 in all courses taken in the History Department at Chicago Circle.

Minor—22 hours, chosen in consultation with the departmental adviser, in one subject; in two subjects, 30 hours, with at least 12 hours in each.

Teacher Education in History: Requirements for Teaching in Secondary Schools

Major—48 hours

Hist. 111, 112, 113, or equivalents and 151, 152, 153 or equivalents*	
United States history	9-12 hours, 200-300 level
European history since 1450	9-12 hours, 200-300 level
Courses related to Europe	9-12 hours, 200-300 level

Minor—The department has no minor requirement for teacher education in history.**

* Only 12 hours in these sequences may be counted toward the 48 required for the major.

** Subject to approval by the Chicago Circle Senate, the Board of Trustees, and the State Board of Higher Education.

Mathematics

Professors

Joseph Landin, Ph.D., Head of the Department; Herbert J. Curtis, Ph.D., Executive Secretary; Harold W. Bailey, Ph.D.; Norman Blackburn, Ph.D.; Flora Dinkines, Ph.D.; Philip Dwinger, Ph.D.; Irwin K. Feinstein, Ph.D.; Evelyn Frank, Ph.D.; Henry L. Garabedian, Ph.D.; Victor K. A. M. Gugenheim, Ph.D.; Miles C. Hartley, Ph.D. (Emeritus); Noboru Ito, Ph.D.; Louis L. Pennisi, Ph.D.; Robert Taylor, Ph.D.; Victor Twersky, Ph.D.

Associate Professors

Furio Alberti, Ph.D.; Warren H. Brothers, Ph.D.; Peter N. Burgoyne, Ph.D.; Djairo DeFigueiredo, Ph.D.; Paul Fong, Ph.D.; Norman T. Hamilton, Ph.D.; Alice G. Hart, M.S.; William A. Howard, Ph.D.; Shmuel Kantorovitz, Ph.D.; R. James Milgram, Ph.D.; Kenneth H. Murphy, M.S.; M. P. Murthy, Ph.D. (Visiting); Reuben Sandler, Ph.D.; W. Forrest Stinespring, Ph.D.; Avrum I. Weinzweig, Ph.D.

Assistant Professors

Ruth M. Ballard, Ph.D.; Michael V. D. Burmester, Ph.D. (Visiting); Raymond T. Czerwinski, Ph.D.; James A. Donaldson, Ph.D.; Verena Dyson, Ph.D.; Helmut P. Epp, Ph.D.; David A. Foulser, Ph.D.; Louis I. Gordon, Ph.D.; Brayton I. Gray, Ph.D.; Morton E. Harris, Ph.D.; Melvin L Heard, Ph.D.; Roger G. Hill, B.A.; Carol M. Knighten, Ph.D.; Lawrence L. Larmore, Ph.D.; Richard Larson, Ph.D.; Sim Lasher, Ph.D.; Jeff E. Lewis, Ph.D.; Maciej Maczynski, Ph.D. (Visiting); Alan McConnell, Ph.D.; James W. Moeller, Ph.D.; P. K. Pathek, Ph.D.; Arthur Pu, Ph.D.; Lena Pu, Ph.D.; Durga Ray, Ph.D.; Yoram Sagher, Ph.D.; Doris Schattchneider, Ph.D.; Nicholas C. Scholomiti, M.A.; David M. Segal, Ph.D.; Robert I. Soare, Ph.D.; Alexander P. Stone, Ph.D.; Srinavas Swaminathan, Ph.D. (Visiting); Alexander Zabrodsky, Ph.D.; Leo F. Ziomek, Ph.D.

Instructors

Winifred Berglund, M.A.; Kathleen M. Hotton, M.A.; Betty J. Kuzmanic, M.Ed.; Julia B. Linn, M.S.; Jeanette S. Lumley, M.A.; Grace M. Nolan, M.A.; Charles E. Olsen, B.S. (Emeritus); Thomas B. Ondrak, M.S.; Helen W. Sears, M.A.; Rose L. Shook, M.A. (Emerita); Laurence R. Sjoblom, B.S.; Rose L. Vedral, M.A.; Rosemary Wiley, M.A.; Zia-E-Khrusheed, M.S.

Assistants

William Adams, B.A.; Ronald Beckman, B.S.; Bruce Buchowicz, B.S.; Alan J. Burger, B.S.; Jordan M. Epstein, B.S.; David C. Feinstein, M.S.; Peggy Fujinaka, B.S.; Erwin S. Janush, B.A.; Marjorie W. McNichols, M.A.; Janet B. Mellinger, M.S.; Martha G. Miller, B.A.; Edward C. Moder, B.S.; Arthur G. Oster, B.S.; Mark D. Pankin, B.A.; Manuel J. Parra, M.S.; William H. Patton, B.S.; Allen L. Pekar, B.S.; Peter Pekar, M.S.; Judith M. Povilus, B.S.; David Rocke, B.A.; Sharlene Rosen, B.S.; Fred L. Rufus, B.S.; Carol L. Schiller, M.A.; Howard A. Silver, B.A.; Robert Spooner, B.A.; Ronald J. Surz, B.S.; Raija Virtanen, B.S.; Michael Yanoff, B.S.

Major—for the degree of Bachelor of Science, 56 hours which must include:

Math. 130, 131, 132, 133	20 hours
Math. 310, 311, 312, 340, 341, 342	19 hours

The remaining hours are to be chosen from mathematics courses numbered 195 or higher. Each mathematics major is assigned a departmental adviser and the student's choice of courses must be approved by the adviser.

Departmental Distinction: The student must qualify for College Honors and must have done exceptional work in mathematics, as determined by the department. Generally. a 4.500 average on all upper division work is required.

Minor—30 hours, chosen in consultation with and with the approval of the departmental adviser, from one or two subjects, with at least 12 hours in each if two are

chosen. Students should note that the use of courses outside the College of Liberal Arts and Sciences is subject to the general College rules.

Teacher Education in Mathematics: Requirements for Teaching in Secondary Schools

Major—55-57 hours
Math. 130, 131, 132, 133
300, 301, 302, 303, 304
305, 307, 310, 340, 341
342 or 348
Electives: 5-19 hours

Minor—34-36 hours
Math. 130, 131, 132, 133
300, 307
310 and 302 or
340 and 303 or
348 and 303

Students in the Teacher Education in Mathematics curriculum are strongly urged to choose electives from areas of study which will support their major programs. The departmental advisers for this curriculum will be glad to assist the student in the selection of such courses.

Music

Milan Kaderavek, M.Mus., Acting Head of the Department.

Assistant Professors
William M. Kaplan, Ph.D.; Richard E. Norton, D.Mus.

Instructors
Euana Gangware, M.M.Ed.; Milan Kaderavek, M.Mus.; Nicholas J. Valenziano, M.Mus.

Assistants
Richard Billingham, M.Mus.; Phillip Hahn, M.Mus.; Maxine E. Mandell, B.Mus.

Major—for the degree of Bachelor of Arts, 56 hours, including
Mus. 101, 102, 103, 104, 105, 106, 107, 108, 109,
110, 111, 112, 120, 121, 151, 152, 153, 200,
201, 202, 203, 204, 300, 301, 302.

Music 151 or 152 or 153 must be repeated for a total of 8 quarters. Degree candidates must demonstrate keyboard proficiency and sufficient proficiency in basic music theory to enroll in Music 101.

Minor—18 hours, chosen in consultation with the departmental adviser, in one department or 24 hours in two departments.

Philosophy

Professors
Ruth B. Marcus, Ph.D., Head of the Department (1967-1968 academic year); George T. Dickie, Ph.D.; Daniel J. Morris, Ph.D.; Paul Ziff, Ph.D.

Associate Professors
Arnold B. Levison, Ph.D.; William W. Tait, Ph.D.; Irving Thalberg, Ph.D.

Assistant Professors
Sandra L. Bartky, Ph.D.; Marcia M. Eaton, Ph.D. (Visiting); Rudolf Grewe, Ph.D.; Terence D. Parsons, Ph.D.; Brian Skyrms, Ph.D.

Instructors
Robert R. Page, M.A.; Arthur Weintraub, B.A.

Assistants
Nelson Calderone, B.A.; Barbara Cameron, B.A.; Gordon D. Cohen, M.A.; Mary B. DeLamar, B.A.; Jay Kantor, M.A.; Arthur B. Millman, M.A.; Peter D. Richardson, M.A.; William Sellar, B.A.; David Temkin, B.A.; Malcolm G. Young, M.A.

Lecturers
Kathryn P. Parsons, B.A.

Major—for the degree of Bachelor of Arts, 42 hours including:
Phil. 201, 203, 211, 330, 332
Philosophy 299 (Seminar) is recommended.
Majors are assigned a departmental adviser.

Departmental Distinction: Awarded by the Department on the basis of course work plus an original paper. Consult with the Department about eligibility and procedures to be followed.

Minor—22 hours in one field or 30 hours in two fields other than philosophy chosen in consultation with the departmental adviser.

Physics

Professors
Swaminatha Sundaram, D.Sc., Acting Head of the Department; Seymour Bernstein, Ph.D.; Arnold R. Bodmer, Ph.D.; Edward McNeil, Ph.D.; Rupert M. Price, M.A. (Emeritus); Ora L. Railsback, Ph.D. (Emeritus); R. Curtis Retherford, Ph.D.; Herman B. Weissman, Ph.D.; Lester Winsberg, Ph.D.

Associate Professors
William R. Anderson, M.S.; David Cohen, Ph.D.; James W. Garland, Ph.D.; Herman J. Johnson, M.S.; William J. Otting, Ph.D.; John N. Pappademos, Ph.D.; Harold M. Skadeland, M.A.

Assistant Professors
Larry L. Abels, Ph.D.; Stanley Aks, Ph.D.; Richard A. Carhart, Ph.D.; Howard

Goldberg, Ph.D.; Jared W. Haslett, M.S.; Gloria Hoff, Ph.D.; Stephan J. Krieger, Ph.D.; Isidor Lerner, M.A.; Ogden Livermore, M.A.; Donald W. McLeod, Ph.D.; Seymour Margulies, Ph.D.; Fishel E. Moraine, *Dipl. Ing.*; Albert F. Silkett, B. A.; Julius Solomon, Ph.D.; David J. Vezzetti, Ph.D.

Assistants

S. K. Agarwal, M.S.; Thomas R. Banach, B.S.; Joanne L. Buck, B.S.; Naim Elyashar, B.S.; Craig L. Foster, B.S.; Rostyslav Kutko, B.S.; Anthony Momose, M.S.; Richard J. Reif, B.S.

Lecturers

James Mangan, Ph.D. (Visiting); Marvin C. Mertz, Ph.D. (Visiting).

Major—for the degree of Bachelor of Arts, 47 hours, including the following:
Phys. 111, 112, 113, 114,
301, 302, 304, 321, 331, 341, 371
Majors are assigned a departmental adviser.

Departmental Distinction: Candidates must register for Physics 392, Undergraduate Research, to be considered. Awards of Distinction, High Distinction, and Highest Distinction will be based on the quality of the work submitted and the recommendation of the instructor.

Minor—31 hours in one or two departments, chosen in consultation with the departmental adviser, with at least 12 hours in each if two are chosen.

Teacher Education in Physics: Requirements for Teaching in Secondary Schools

Major—47 hours
Physics 111, 112, 113, 114, 301, 302, 304, 321, 331, 341, 371
Physics elective
Minor (second field of specialization) 31 hours
Physics 111, 112, 113, 114, 321
Physics electives (8 hours)

Supporting Courses—38 hours
Mathematics 130, 131, 132, 133, 310, 220
Chemistry 112, 113, 114

The Physics Curriculum

The degree of Bachelor of Science in physics is awarded students who successfully complete this curriculum in the College of Liberal Arts and Sciences.

180 hours, exclusive of physical education and basic military science, distributed as follows:

Rhet. 101, 102	8 hours
Chem. 117, 118, 119	15

Foreign language (the equivalent of two years in a single language, at the college level)	0-24
Social Science	12
Humanities	12
Math. 130, 131, 132, 133	20
310, 311, 220	10
Phys. 111, 112, 113, 114	19
301, 302,	8
304, 371, 381	12
321, 322, 341, 342,	16
331, 361	8
Electives	12-36

Political Science

Professors

Hollis W. Barber, Ph.D., Head of the Department; Twiley W. Barker, Jr., Ph.D.; Herman Finer, D.Sc. (Visiting); Boyd R. Keenan, Ph.D.

Associate Professors

Leonard E. Goodall, Ph.D.; Doris A. Graber, Ph.D.; James B. Holderman, Ph.D.; Milton L. Rakove, Ph.D.

Assistant Professors

George D. Beam, Ph.D.; Byung C. Koh, Ph.D.

Instructors

Roosevelt Ferguson, M.S.P.A.; Malcolm G. Hicks, B.A.; Philip B. Lyons, M.A.; Kaye M. Miller, M.A.; Dick W. Simpson, M.A.

Assistants

Kathleen A. Cranley, M.A.; Juanita L. Garner, M.A.; Sherry M. Joseph. B.A.; Sandra S. Levy, M.S.; James D. Nowlan, M.A.; Innes M. Sheridan, B.A.

Major—for the degree of Bachelor of Arts, 36 hours, distributed as follows:
Political Science 150, 151
4 hours in each of three of the following:
Government and Administration (in addition to 150, 151)
Political Theory
Public Law
International Affairs

A major may include 5 hours from related departments, chosen with the advance approval of the department.

Departmental Distinction: To be considered for departmental distinction the student must have an all-University grade-point average of 4.250, an average of 4.500 in all his political science courses, must present an acceptable essay written while he is enrolled in Political Science 299 (both course and credits must be beyond those required for the major), and pass a comprehensive examination in political science. A student working in this program must expect to enroll in Political Science 299 for at least 4 hours credit during his tenth and/or eleventh quarters; thus, if he expects to graduate in June, he should enroll during the fall and/or winter quarters of his senior year. Further details may be obtained in the Political Science departmental office.

Minor—20 hours, chosen in consultation with the department adviser, in a single department or 24 hours in two related departments.

At least half of the hours offered for the minor(s) must be in courses numbered 200 or above.

Teacher Education in Political Science: Requirements for Teaching in Secondary Schools

Major—48 hours	*Minor*—30 hours
PolS. 150, 151	PolS. 150, 151
4 hours in *each* of the following:	4 hours in *each* of two
Government and Administration	fields of the major
Political Theory	Not more than 12 hours of
Public Law	100-level courses
International Affairs	14 hours of political
Not more than 12 hours of 100-level political science courses	science electives
Electives: 2-22 hours	

Note: The major may include 12 hours from a related department.

Psychology

I. E. Farber, Ph.D., Head of the Department (1967-1968 academic year); Harry S. Upshaw, Ph.D., Associate Head.

Professors

Philip Ash, Ph.D.; Rosalind D. Cartwright, Ph.D.; I. E. Farber, Ph.D.; Paul C. Greene, Ph.D.; Harold Klehr, Ph.D.; Eli A. Lipman, Ph.D.

Associate Professors

Louis A. Berman, Ph.D.; William H. Bogartz, Ph.D.; John D. Davis, Ph.D.; Derek P. Hendry, Ph.D.; Allen H. Howard, Ph.D.; Susan M. Markle, Ph.D.; Nan E. McGehee, Ph.D.; M. Henry Pitts, Ph.D.; Evalyn F. Segal, Ph.D.; Harry S. Upshaw, Ph.D.; Robert S. Wyer, Ph.D.; Lucy C. Zaccaria, Ph.D.

Assistant Professors

Roger L. Dominowski, Ph.D.; Marie A. Ferguson, Ph.D.; Philip E. Freedman, Ph.D.;

Howard Gadlin, Ph.D.; Barry S. Greenwald, Ph.D.; Floyd S. Irvin, Ph.D.; Vivian C. Lipman, Ph.D.; Mary J. Luetgert, Ph.D.; Alexander J. Rosen, Ph.D.

Instructors

James W. Creaser, M.A.; Allan Seltzer, B.A.; Thomas A. Tyler, B.A.

Assistants

Mary A. Bailey, B.A.; Roberta A. Barker, B.A.; Richard A. Bednar, B.S.; Joseph A. Buga, B.S.; Boyd S. Callahan, B.A.; Lee Goldberg, B.S.; Caesar A. Gonzalez, B.S.; Dennis M. Groner, B.S.; Mitchell Jacobs, B.A.; Douglas M. Johnson, B.A.; Susan M. Kornblum, B.A.; Scott M. Lash, B.S.; Marcella Morrison, B.S.; Constance C. Oliphant, B.A.; Carol Peterson, B.A.; Robert W. Ratzel, B.S.; Carl T. Renfro, B.A.; Rona Ruben, B.A.; Hubert H. Rehm, B.S.; John J. Ryan, B.S.; Carol A. Swanson, B.A.; Richard E. Tessel, B.A.; Kay K. Yamamoto, B.A.

Lecturers

Theta H. Wolf, Ph.D.

Postdoctoral Fellows

Edward M. Gurowitz, Ph.D.

General Major—36 hours, for the degree of Bachelor of Arts (primarily for students in general liberal education) including:

Psch. 100 or 102; Psch. 240 or 241 or 243
Any other psychology courses to fulfill 36 hours requirement
Eight hours in another social science

Behavioral Science Major—36 hours,* for the degree of Bachelor of Science (for students preparing for graduate work in psychology) including:

Psch. 100 or 102; Psch. 241, 243, and 299
At least three from Psch. 250, 251, 252, 256, 318
Three quarters of mathematics including either Math. 110 and 194 or 132
Phil. 222

Behavioral science majors must have a minimal grade-point average of 3.750, subject to decision of the adviser.

Departmental Distinction: Candidate must be eligible for College Honors, must satisfactorily complete the required program for Behavioral Science majors, and must complete a satisfactory thesis in Psychology 299.

Minor—18 hours in one field or 24 hours in two fields other than psychology, chosen in consultation with the department adviser.

* Subject to approval by the Chicago Circle Senate, the Board of Trustees, and the State Board of Higher Education.

Sociology

Professors

Robert L. Hall, Ph.D., Head of the Department; Robert E. Corley, Ph.D.; Peter P. Klassen, Ph.D.; Ethel Shanas, Ph.D.

Associate Professors

Bernard H. Baum, Ph.D.; Roger W. Little, Ph.D.; George J. McCall, Ph.D.; Mildred A. Schwartz, Ph.D.

Assistant Professors

Ozzie L. Edwards, Ph.D.; John W. Martin, Ph.D.; Valerie K. Oppenheimer, Ph.D.; Gerald M. Swatez, Ph.D.; Ronald C. VanderKooi, Ph.D.; James L. Wilkins, Ph.D.

Instructors

William E. Bezdek, M.A.; Kathleen Crowley, M.S.; Kenneth Fidel, M.A.; Charles A. Goldsmid, M.A.; Richard J. McKinlay, M.A.; Michal McCall, M.A.; Helen R. Miller, M.A.; James J. Vanecko, M.A.

Major—For the degree of Bachelor of Arts, 42 hours after Soc. 100, including the following:

Soc. 185 or Psch. 243
Soc. 262
Soc. 263
30 additional hours in sociology or from the approved list of collateral courses in other departments. At least 18 of these hours must be in sociology. Up to 12 hours may be from the following list, provided that the same courses are not counted toward the minor or other requirements:
Anth. 273, 274, 317, 390
Hist. 373, 374, 377, 378, 379
Math. 194, 195
Phil. 222, 345
Psch. 210, 215, 315, 317, 318

Departmental Distinction: A candidate must have a 4.000 all-University grade-point average, must meet all general requirements for a major in sociology, complete Soc. 287 and Soc. 288 (Senior Seminar), and at least 4 hours credit in Soc. 299 (Individual Study).

Minor—18 hours in one department or 24 hours in two. At least half the credits must be in courses above the 100 level.

Teacher Education in Sociology: Requirements for Teaching in Secondary Schools

In addition to the regular education requirements listed in this Catalog:

Major—48 hours, including the following:
Soc. 100
Soc. 130
Soc. 185
28 additional hours, at least 20 of which must be in 200-and 300-level courses in sociology
Anth. 103 and 104

Minor—32 hours, including the following:
Soc. 100
Soc. 130
Soc. 185
12 hours in 200- and 300-level courses in sociology
Anth. 103 and 104
Electives: 0-22 hours

Spanish

James D. Compton, Ph.D., Acting Head of the Department

Professors
Jose Sanchez, Ph.D.

Associate Professors
Violet Bergquist, M.A.; Eduardo Betoret-Paris, Ph.D.

Assistant Professors
James D. Compton, Ph.D.; Battista J. Galassi, Ph.D.; Jerry R. Rank, Ph.D.

Lecturers
Dionisio Garzon, Ph.D.

Instructors
Constance K. Adelman, M.A.; Pedro J. Algarin, M.A.; Manuel Blanco-Gonzalez, M.A.; Judith G. Chandran, M.A.; Lydia Z. Fernandez, M.A.; Walter J. Guevara, M.A.; Norma Guice, M.A.; Shirley Krull, M.A.; Dennis G. Nazek, M.A.; Mariano Quintana, Jr., M.A.; Oscar Rodriguez, M.A.; Susan Socolow, M.A.; Ferdina J. C. Tort, M.A.; Philip L. Vandrey, M.A.

Major—40 hours (exclusive of courses given in translation) in 200-level courses or above for the degree of Bachelor of Arts, including:
Span. 221, 222, 223, 224
at least 18 hours in 300-level courses

Note: Span. 101, 102, 103, 104, 105, 106 do not count toward the major.

Departmental Distinction: The student must complete at least 18 hours in upper division courses with an average of 4.500 to be considered for departmental distinction.

Minor—30 hours, chosen in consultation with the departmental adviser, in not more than two subjects, with at least 12 hours in each if two are chosen. Minors outside the College require approval by the adviser.

Teacher Education in Spanish: Requirements for Teaching in Secondary Schools

Major—49 hours	Minor—30 hours
Span. 211, 212, 213, 214, 215	Span. 104, 105, 106
216, 218, 221, 222, 280,	211, 212, 213
281, 332, 350, 351, 352, 353	214, 215, 216

At least 5 hours in literature courses above the 200 level.

Speech and Theatre

Professors

R. Victor Harnack, Ph.D., Head of the Department; Donald H. Dickinson, Ph.D.; Carl A. Pitt, Ph.D.

Associate Professors

John Haney, Ph.D.; Chester C. Long, Ph.D.

Assistant Professors

Helen J. Hovde, M.A.; Raoul F. Johnson, Ph.D.; Beverly Lusty, Ph.D.; Nicholas Moravcevich, Ph.D.; Barbara S. Wood, Ph.D.

Instructors

Ann Armstrong, M.A.; Carol A Berthold, M.A.; Janice M. Crews, M.A. (Emerita); Julia M. Curry, M.S.; Frances M. Goulson, M.T.A. (Emerita); Conde R. Hoskins, M.A.; John A. Jones, M.A.; Theodore V. Kundrat, M.A.; William F. Raffeld, M.A.; Roger A. Skolnik, M.A.

Assistants

William Snyder, B.A.

All majors must demonstrate proficiency in public speaking and oral reading at the Speech 101, 141 levels.

Major—for the degree of Bachelor of Arts, 36 hours (exclusive of Speech 101 and 141) distributed as follows:

Spch. 201 or 202

one of the following options:

Communication and Public Address
Spch. 111, 112, 113
Any two of 211, 212, 213
301 or 302
One of 311, 312, 313
Theatre and Oral Interpretation of Literature:
Spch. 121, 122, 123, 151
251, 261,
321, 322
Television and Radio
Proficiency in Spch. 131 (does not count toward the major)
Spch. 111, 112, 113
231, 232, 233
331 or 332, 333

Departmental Distinction: To be graduated with Distinction, a candidate must have a cumulative grade-point average of 4.000 and a grade of B in Speech 298; with High Distinction, either a cumulative grade-point average of 4.000 and a grade of A in Speech 298 or a cumulative grade-point average of 4.250 and a grade of B in Speech 298; with Highest Distinction, a cumulative grade-point average of 4.250 and a grade of A in Speech 298.

Minor—18 hours in one department, chosen in consultation with the departmental adviser, or 24 hours in two departments.

Teacher Education in Speech: Requirements for Teaching in Secondary Schools

Major—48 hours
Communication and Public Address:
Speech 101 or 102, 141, or proficiency*
111, 112, 113
151, 201 or 202, 211
121, 212, 213, 264

Minor—30 hours
Speech 101, 141, or proficiency*
111, 112, 113, 201 or 202,
211 or 212 or 213

Theatre and Oral Interpretation:
101 or 102, 141, or proficiency*
111, or 112 or 113
121, 122, 123, 151
201 or 202, 211 or 212 or 213
241, 261, 264
Electives: 0-22 hours

Minor—30 hours
101, 141 or proficiency*
121, 122, 123, 151
201 or 202, 241, 264

* If the student demonstrates proficiency in Speech 101 and 141 (by departmental examination), additional hours must be taken to achieve the 48-hour requirement for the major and the 30-hour minimum requirement for the minor.

The Preprofessional Programs

The College offers work, in varying degrees, that prepares the student to enter the professional fields.

Occupational Therapy—Minimum grade-point average: 3.500.

The first year is taken in the General Curriculum of the College of Liberal Arts and Sciences. Before a student is admitted to the curriculum, he must be personally interviewed by the Director of the occupational therapy curriculum at the School of Associated Medical Sciences, University of Illinois at the Medical Center.

Rhet. 101, 102	8 hours
A & A 101, 102, 103	9
Chem. 111, 112, 113 or	
Chem. 112, 113, 114 or	11-12
PSci. 101, 102, 103	
Recommended electives from history, literature, speech (1 quarter)	16

The second and third years are taken on the Urbana campus: the fourth and fifth (16 calendar months), at the Medical Center. The degree is awarded by the College of Medicine. The student must also fulfill the foreign language requirement stated in the Urbana Catalog before he transfers to the Medical Center. If he takes a foreign language at Chicago Circle, the hours will be deducted from the recommended electives listed above.

Complete Preprofessional Programs are offered in prelaw, medical record administration, medical record technology, dentistry, medicine, nursing, pharmacy, and veterinary medicine.

Meetings are arranged to permit students in the preprofessional programs to discuss academic problems with representatives from the professional colleges.

The minimum admission requirements for each of the professional programs follow.

Prelaw—A baccalaureate earned in a department of the College of Liberal Arts and Sciences and a 3.500 average qualify a student for application to the University of Illinois College of Law.

Medical Record Administration—Minimum grade-point average: 3.000.

135 hours, exclusive of physical education and basic military science, distributed as follows:

Rhet. 101 102	8 hours
Foreign language (one)*	24
Biological sciences	12

Physical science	12
Social science	12
Humanities	12
BioS. 160, 161	10
Electives	45

The fourth year is taken in the College of Medicine, which also awards the degree.

Medical Technology—Minimum grade-point average: 3.000.

135 hours, exclusive of physical education and basic military science, distributed as follows:

Rhet. 101, 102	8 hours
Foreign language (one)*	24
Social Science	12
Humanities	12
Chem. 112, 113, 114	12
121, 133, 134	13
(350 and 355 are recommended)	
Phys. 101, 102, 103	15
BioS. 100, 101, 102, 250	17
8 hrs. from BioS. 140, 160, 161, 205, 350, 363, 364	8
Math. 105 (or placement)	3
Electives	11

The fourth year is taken in the College of Medicine, which also awards the degree.

* Or the equivalent of two college years in one language.

Predentistry—Minimum grade-point average: 3.250.

Students must take the Dental Aptitude Test. Application forms and details may be obtained from the College Desk, Room 1523, University Hall.

90 quarter-hours, exclusive of physical education and basic military science, distributed as follows:

Rhet. 101, 102	8 hours
Chem. 112, 113, 114, 233, 234 or 117, 118, 119, 133, 134	22-23
BioS. 100, 101, 102	12
Phys. 101, 102	10
Electives (Physics recommended)	37-38

Premedicine—A grade-point average of not less than 3.500 when applying for admission to the College of Medicine, University of Illinois.

A student who is considering entering medical college should become familiar with the particular requirements of the schools to which he intends to apply.

Each year the Association of American Medical Colleges issues *Medical School Admission Requirements*, a compilation of the admission requirements of accredited medical schools. A student in premedicine will find this an invaluable guide to admission requirements.

Admission to the premedical curriculum at Chicago Circle is in no sense a guarantee of subsequent acceptance by the College of Medicine of the University.

The catalog of the University of Illinois College of Medicine states the following:

"Students seeking admission to the College of Medicine after July 1, 1968, must:

1. Demonstrate in addition to academic achievement, the emotional maturity, the integrity, and the motivation judged necessary for the successful study and practice of medicine.
2. Have received a baccalaureate degree (ordinarily A.B. or B.S.) from a recognized college or university or be eligible to receive such a degree upon satisfactory completion of the curriculum of the first year in the College of Medicine. Students from colleges that do not grant a degree after the satisfactory completion of the first year of medicine may be considered for admission after satisfactory completion of three years (not less than ninety semester hours) of college work if such students are eligible for full senior status (i.e., eligibility to receive a baccalaureate degree after completion of the senior year) in that college."

The undergraduate program must include as a minimum:

Biology. A full year's course beyond BioS. 100, 101, 102 (usually animal) with appropriate laboratory work. This course should emphasize the cellular and molecular aspects as well as the structure and function of living organisms.

Chemistry. Two years of college chemistry, divided about equally between organic and inorganic. Laboratory work and familiarity with quantitative techniques are important aspects of this experience.

Physics. One full year of college credit in physics (with laboratory experience).

The college major should be in the field that the student finds most interesting. If he chooses a division of science, he should try to get as broad an experience in the humanities as feasible. If he chooses the humanities, he should be certain to include the minimum science requirements but not necessarily limit himself to these minima. The College of Medicine would expect some studies but not require specific sequences in English and foreign languages. Mathematics through calculus is recommended. Psychology and sociology are examples of studies that are of value in the understanding of behavior and will complement studies both in the sciences and humanities. The applicant must have obtained a satisfactory score on the Medical College Admission Test.

Grade Requirements. A grade-point average of not less than 3.500 or its equivalent as determined by the University for institutions using a different grading system is required.

The grade-point average is computed by the Office of Admissions and Records on the basis of grades recorded in the Office of Admissions and Records at the time the application is acted upon by the Committee on Admissions and is computed by using all grades earned including graduate courses but excluding:

1. Grades earned in such activities as physical education, band, etc.
2. Graduate seminars and research courses.
3. Professional technical or vocational courses.

Medical College Admission Test. All candidates are required to take the Medical College Admission Test recommended and approved by the Association of American Medical Colleges.

Bachelor's Degree. The College of Liberal Arts and Sciences at Chicago Circle campus accepts a total of thirty-two hours of credit from the first year at the University's College of Medicine to enable the student to complete the requirements for a bachelor's

degree as well as a medical degree in seven rather than the usual eight years. This program requires that (1) the student be in good standing in the College of Medicine; (2) work taken at the College of Medicine does not duplicate work taken in premedical courses; (3) the student complete the third or last year of premedical study, consisting of at least thirty hours of credit, at Urbana or Chicago Circle; and (4) the student meets all requirements for graduation from the College of Liberal Arts and Sciences.

The following are the College of Medicine courses accepted by the College of Liberal Arts and Sciences and the majors to which they apply:

1. Biochemistry 301, 302, and 303, to be applied to a chemistry major or for elective credit at the upper-division level for a total of nine quarter hours.
2. Physiology 301, 302, and 303, to be applied to a biology major or for elective credit at the upper-division level for a total of fifteen quarter hours.
3. Histology, to be applied to a biology major or as elective credit at the upper-division level for a total of twelve quarter hours.
4. Gross anatomy, to be applied to a biology major or for elective credit at the upper-division level for a total of twelve quarter hours.

Prenursing—Minimum grade-point average: 3.000.

45 hours, exclusive of physical education, distributed as follows:

Rhet. 101, 102	8 hours
BioS. 100, 101	8
Chem. 112, 132	9
Soc. 100	4
Psch. 100	4
Humanities	8
Electives (BioS. 102 recommended)	4

Prepharmacy—Minimum grade-point average: 3.000.

45 hours, exclusive of physical education, health science, and military science, distributed as follows:

Rhet. 101, 102	8 hours
Chem. 112, 113, 114 (or 117, 118, 119)	12-15
Math. 104, 105 (or 100, 101)	8-10
Electives (foreign language, humanities, social science)	12-17

Preveterinary Medicine—Minimum grade-point average: 3.500.

96 hours, exclusive of physical education and military science, distributed as follows:

Rhet. 101, 102	8 hours
BioS. 100, 101, 102	12
Phys. 101, 102, 103	15
Chem. 112, 113, 114, 121 (or 117, 118, 119) 133, 134	23-25

Foreign language (one)	12
Social Sciences*	12
Humanities*	12

* Courses to be selected in consultation with a college adviser.

The first year of the curricula in forestry and home economics, as well as two years of prejournalism may be taken within the General Curriculum.

The Division of Physical Education

Sheldon L. Fordham, Ed.D., Director
Charles J. Kristufek, M.S., Assistant Director

The Division of Physical Education serves a dual function—it offers a wide variety of courses from which the student may fulfill his physical education requirement, and it offers a professional program in which students majoring in physical education may study for the degree of Bachelor of Science in Physical Education.

The Required Program for Students Enrolled at Chicago Circle

Men and women entering the University with less than 90 quarter hours of credit are required to secure six quarters of credit in physical education, including any amount transferred, unless they are over thirty years of age. Credit and grades for these six quarters of required physical education are not included in the total hours or the scholastic average required for graduation.

The evaluated results of the preregistration medical examination are used to prescribe each student's program. Students with handicaps are assigned activities commensurate with their physical ability.

The Men's Program covers prescribed exercises, developmental activities, beginning swimming, intermediate swimming and water polo, advanced swimming and diving, lifesaving and skindiving, individual tumbling stunts, apparatus stunts, circus stunts, boxing, sabre fencing, wrestling, foil fencing, track and field athletics, personal-defense activities, weight training, individual athletics, weight lifting, flickerball, touch football, softball, soccer, volleyball, basketball, speedball, archery, squash racquets, handball, tennis, badminton, bowling, golf, backyard sports, and ballroom dance and American square dance. All beginning male students are assigned to PEM 106 except those in PEM 101.

Every effort is made to include the student in at least one course in the following general areas: developmental activities, swimming, gymnastics, combatives, and recreational activities. Students are not generally assigned to courses in which they have a high level of fundamental skills. Practically every course in the program involves large amounts of physical activity.

All courses in the required basic-instruction program meet two times a week for a total of one and one-half hours and carry 1 quarter hour of credit. See the Courses of Instruction section for course descriptions.

The Women's Program consists of a one-year required sequence and a one-year elective sequence. The one-year required sequence consists of PEW 100, Conditioning; an elected course from Area I; and an elected course from Area II.

PEW 100, Conditioning, is designed to give the student a better understanding of the structure of the body and its capacity for movement. It includes basic skills as used in sports and rhythmic activity and some relaxation techniques. Area I courses in dance, gymnastics, and diving emphasize the aesthetic use of movement, movement control, coordination, and poise. Area II courses in swimming and field sports aid in the development of strength and endurance. A course may be selected from Area II before or after a course is taken in Area I.

Courses in Area I

PEW 105–Elementary Rhythms
PEW 106–Intermediate Rhythms
PEW 107–Apparatus
PEW 108–Free Exercise
PEW 116–Beginning Diving

Courses in Area II

PEW 110–Beginning Swimming
PEW 111–Advanced Beginning Swimming
PEW 112–Intermediate Swimming
PEW 113–Advanced Swimming
PEW 115–Synchronized Swimming
PEW 122–Speedball
PEW 125–Softball
PEW 126–Field Hockey
PEW 127–Soccer
PEW 138–Track and Field

The student may choose courses for the second year of the physical educa-

tion program. The department strongly urges that this time be devoted to gaining that measure of specialized skill which will encourage further college and adult participation. Excellence in performance is often a prerequisite to continuation in sports, dance, aquatics, and gymnastics after education in the classroom ceases.

Veterans have fulfilled the physical education requirement and are exempt from physical education. However, they are encouraged to utilize the physical education facilities, as are all other students in the University.

Intercollegiate and Intramural Athletics

There is a complete program of intercollegiate athletics, including cross country, soccer, football, ice hockey, basketball, swimming, gymnastics, wrestling, fencing, track and field, baseball, tennis, golf, and volleyball.

Over twenty activities comprise the Men's Intramural Program under the supervision of the Intramural Director.

Women's Athletic Association and Orchesis

The Women's Athletic Association and Orchesis, the modern-dance group, offer women students wide opportunities for extracurricular activities in sports and dance.

The Professional Programs

Physical Education for Men

Leo L. Gedvilas, Head of the Department
Charles J. Kristufek, Supervisor of the Professional Program
Harold H. Nemoto, Supervisor of the Service Program

Professors

Sheldon L. Fordham, Ed.D.; John O. Jones, M.S. (Emeritus).

Associate Professors

Peter R. Berrafato, M.S.; Leo L. Gedvilas, M.S.; Charles J. Kristufek, M.S.; Lester H. Miller, M.A.; Benedict W. Montcalm, M.A.; Walter G. Versen, M.Ed.

Assistant Professors

Robert J. Beck, M.Ed.; James C. Descourouez, Ed.M., Matthew H. Ellsworth, Ed.D.; Harold H. Nemoto, M.A.; Robert L. Nolan, M.Ed.; Richard R. Rader, M.A.; Thomas F. Russo, Ed.M.; George J. Strnad, M.A.

Instructors

Robert W. Danner, M.A.; Ronald S. Feingold, M.S.; Ralph W. Mackh, M.Ed.; Michael B. McGovern, M.A.; Dennis Moll, M.Ed.; John C. Persons, M.A.; Leon F. Pickens, M.S.; Thomas P. Sattler, M.S.; Forrest C. Tyson, M.S.; Kenneth J. Vianello, M.A.; John R. Webster, M.A.

Assistants

Samuel Donnelly, B.S.; John A. Kantarski, B.S.; Steven B. Nasatir, B.S.; Alfred T. Reed, B.S.; Donald G. Scherrer, B.S.

Freshmen who wish to enter the curriculum must meet the entrance requirements of the Division of Physical Education. If space permits, transfer students, from either another college of the University or from other schools and colleges, are limited to those students who have a grade-point average of 3.300 for less than 90 hours or 3.500 or higher for 90 hours or above, in terms of the University of Illinois grading system. For teacher education requirements see pages 92 and 94.

For the degree of Bachelor of Science in Physical Education for Men, a minimum of 203 hours, distributed as follows:

General Education	*Hours.*
BioS. 100, 101, 102–General Biology	12
BioS. 160–Human Biology I	5
BioS. 161–Human Biology II	5
Rhet. 101, 102	8
Speech 101–Principles of Effective Speaking	5
PolS. 151–American Government: Organization and Powers	4
Humanities courses	12
History 153–History of the U.S. from 1890	4
Psychology 100–Introduction to Psychology	4
Sociology 100–Introduction to Sociology	4
Health Science 180–Personal and Community Health	3
	66

Education	
Ed. 170–Educational Foundations	4
Ed. 210–The Educative Process	4
Ed. 230–Curriculum and Instruction in Secondary Schools	4

Ed. 250–Educational Evaluation	4
Ed. 270–Educational Practice with Seminar	12
	28

Courses in the Major

PEM 170–Baseball	4
PEM 171–Basketball	4
PEM 172–Football	4
PEM 173–Gymnastics	2
PEM 174–Swimming	4
PEM 175–Track and Field Athletics	4
PEM 176–Wrestling	4
PEM 177–Fundamentals of Special Activities	2
PEM 178–Fundamentals of Special Activities	2
PEM 179–Handball, Archery and Golf	2
PEM 180–Fitness Programs	4
PEM 185–Introduction to Physical Education	3
PEM 188–History of Sports	4
PEM 250–Kinesiology	5
PEM 251–Physiology of Muscular Activity	4
PEM 252–Theory of Prescribed Exercise	4
PEM 253–Tests and Measurements in Physical Education	4
PEM 255–First Aid and Care and Prevention of Athletic Injuries	4
PEM 260–Organization of Physical Education Programs	3
PEM 261–Organization of Athletic Programs	3
PEM 262–Organization and Administration of Intramural Sports Programs	3
	73

The hours earned in military science and in satisfying the general University requirement of six quarters in physical education do not count toward the degree.

Minors and Electives:

Additional courses are necessary to complete the required number of hours for graduation from the curriculum. Recommended electives are selected with the help of the faculty adviser	0-36
Total Hours Required For Graduation	203

Physical Education for Women

WILMA J. PESAVENTO, Head of the Department
HELEN HEITMANN, Supervisor of the Professional Program
MARY E. MCQUIETY, Supervisor of the Service Program
DOROTHY HJERMSTAD, Supervisor of the Professional Elementary Grades Program

Professors

HELEN M. BARTON, Ed.D. (Emerita); Dorothy Gillanders, Ph.D.

Associate Professors

Helen Heitmann, D.P.E.; Wilma Pesavento, Ph.D.

Assistant Professors

Mary A. DiVito, Ed.M.

Instructors

Eleanor Abbey, M.A.; Joanna Hall, M.A.; Mary McQuiety, M.S.

Assistants

Carol A. Galas, B.S.; Dorothy Hjermstad, B.A.; Patricia Hostetter, B.A.; Dalia Jeziorski, B.S.; Concetta Licausi, B.S.; Karen L. Minarik, B.S.; Pauline Peterson, B.S.; Janet M. Sewell, B.S.; Ruth G. Thomas, B.S.; Erna Wachtel.

Lecturers

Pirkko Tommila, *Cum Laude Approbatur* (Visiting).

Two options are available to the student who seeks the degree of Bachelor of Science in Physical Education for Women:

Option I—For the high school teaching certificate. A minimum of 196 quarter hours of credit is required for graduation.

Option II—For the special certificate for teaching grades 1 through 12. A minimum of 195 quarter hours of credit is required for graduation.

Required Courses for Options I and II

General Education	*Hours*
Rhetoric 101, 102	8
Biological Sciences 100, 101, 102, 160, 161	22
Humanities (Approved departmental sequences)	12
Mathematics	3-5
Psychology 100	4
Speech 101	5
Health Science 180	3
History 152 or 153	4
Political Science 151	4
	67

Education	
Ed. 170–Educational Foundations	4
Ed. 210–The Educational Process	4
Ed. 230–Curriculum and Instruction in Secondary Schools	4

Ed. 250–Educational Evaluation	4
Ed. 270–Educational Practice with Seminar	12
	28

Courses in the Major

Activity Courses

PEW 110, 111, or 112—Beginning, Advanced Beginning, or Intermediate Swimming	1
PEW 152–Soccer and Speedball	1
PEW 153–Stunts, Tumbling, and Trampoline	1
PEW 154–Volleyball, Track and Field	1
PEW 155–Gymnastics and Apparatus I	1
PEW 156–Swimming II	1
PEW 157–Basketball I and Softball	1
PEW 159–Basketball II and Field Hockey	1
PEW 168–Gymnastics and Apparatus II	1
PEW 201–Archery and Golf	2
PEW 203–Badminton and Tennis	2
Dance 100–Creative Dance	1
Dance 235–Folk, Square and Ballroom	3
PEW Elective	
	17

Theory and Supervised Teaching Courses

PEW 150–Professional Orientation	3
PEW 151–Body Mechanics and Basic Movement	1
PEW 200–Teaching of Dance and Gymnastics	4
PEW 204–Supervised Teaching of Dance and Gymnastics	2
PEW 205–Tests and Measurements in Physical Education	4
PEW 213–Teaching of Sports	4
PEW 214–Supervised Teaching of Sports	1
PEW 222–Physical Education in Elementary and Secondary Schools	3
PEW 230–Kinesiology	5
PEW 250–Organization and Administration of Physical Education	4
PEW 280–History of Sports	4
PEW 281–First Aid	4
PEW 282–Organization of the School Health Program	4
PEW 283–History and Philosophy of Physical Education	4
	47

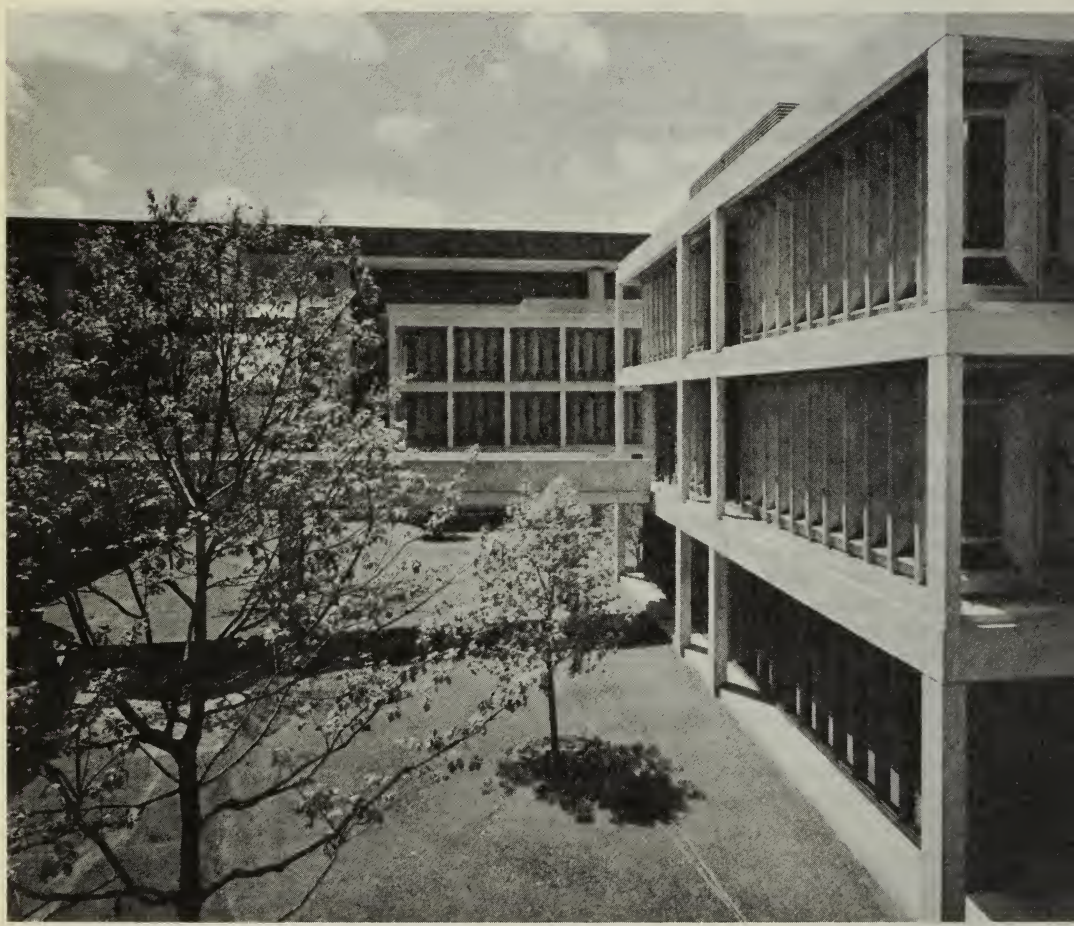
These courses are also required of the students who select Option II:

Elementary School Physical Education Activities

PEW 166–Elementary School Games	3
Dance 200–Teaching of Dance and Gymnastics	3
	6

Additional Requirements

Option I:	
Minor and Electives	36
Option II:	
Electives	29



Courses of Instruction

Courses are grouped alphabetically. Following the number and title of each course is a statement of credit given, content, and prerequisites (if any).

Definition of a credit hour: A University credit hour represents one classroom hour of fifty minutes weekly for one quarter, in lecture or recitation, and either the necessary preparation time or a longer time in laboratory or other exercises for which outside preparation is not required. It is expected that most students will spend two hours preparation for one hour per week of lecture or recitation. Each University quarter-hour credit is thus understood to represent at least three hours of the student's time, and the credit value of a course is calculated in quarter hours on that basis.

The letters **F, W, S,** and **Su** indicate, when used, the quarter in which the course is offered.

Courses for freshmen and sophomores are numbered 100 to 199; for juniors and seniors, 200 to 399. See the appropriate Timetable for the final course offerings for each quarter.

ACCOUNTING

100. Accounting I. 3 hours. Concepts and principles underlying the processing and reporting of accounting information for decision making. Prequisite: Sophomore standing.

101. Accounting II. 3 hours. Internal control as it affects the processing of accounting information; relationship between assets and earnings; effects of valuation methods on income determination. Prerequisite: Actg. 100.

102. Accounting III. 3 hours. Managerial use of accounting information in decision making and planning; standards and budgets as a guide to measuring operating performance. Prerequisite: Actg. 101.

300. Managerial Cost Accounting. 4 hours. Analysis of costs for control, decision making, and planning; standards and budgets as a guide to measuring operating performance. Prerequisite: Actg. 302.

301. Asset Valuation and Income Determination. 4 hours. The development, applications, and limitations of accounting theory as related to the valuation of assets and measurements of income. Prerequisite: Actg. 102.

302. Accounting for Entity Interest. 4 hours. Accounting for rights of creditors, stockholders, and partners in a going concern; effects of expansion and contraction on equities; basic principles of fiduciary and fund accounting. Prerequisite: Actg. 301.

303. Auditing. 4 hours. The history, function, and theory of auditing; nature of the necessary evidence for the accountant's professional opinion concerning a financial position and the results of enterprise operations; applications of statistical sampling; auditing computerized systems. Prerequisite: Actg. 300, 301, 302.

304. Federal Income Tax. 4 hours. Concepts of federal income tax; its effects on decisions of corporations, partnerships, individuals, and trusts. Prerequisite: Actg. 300.

305. Planning and Control. 4 hours. The budget as a formal plan of action; the effect of decision making, forecasting, and uncertainty on the determination of enterprise goals; guidance techniques for the accomplishment of the planned objectives of a firm. Prerequisite: Actg. 300.

306. Readings and Advanced Problems. 4 hours. Consolidated statements, foreign subsidiaries, insurance, estates, theory, general statements. Prerequisite: Actg. 302.

THE ADMINISTRATION OF CRIMINAL JUSTICE CURRICULUM

251. Foundations of Criminal Justice. 4 hours. The development of law as a means of social control, from earliest records through Hammurabi, the Greek and Roman civilizations, European cultures, Anglo-Saxon Britain, the common law, to the present constitutional, statutory, and case law controls in the United States. Prerequisite: Sophomore standing.

252. Administration of Criminal Justice. 4 hours. The development and contemporary operation of the agencies of criminal justice, from police procedures through the prosecution and judiciary, to correctional institutions, including probation and parole. Emphasis is on current philosophies and practices. Prerequisite: Sophomore standing.

257. The Development of Police Systems in Society. 4 hours. The historical development of law enforcement, from earliest beginnings through Anglo-Saxon England to the present systems and operations. A comparative study of the theories and operations of police systems throughout the world. The structure and interrelationships of American police agencies on the federal, state, county, and municipal levels. Prerequisites: CrJ. 251 and 252 or consent of the instructor.

258. Police Administration. 4 hours. The principles of administration and management in their application to law enforcement; a study of the police organizational structure. Responsibilities and interrelationships of administrative and line-and-

staff services. An analysis of the functional divisions of a modern police operation in its application to public safety needs of the community. Prerequisites: CrJ. 251 and 252 or consent of the instructor.

259. **Principles of Criminal Investigation. 4 hours.** Theory and practice of investigation; study of the possible applications of the philosophical principles of deductive and inductive reasoning to criminal investigation. The scientific fact-finding approach in the development of factual data from persons and things. The development and practice of criminal investigation in the field of law enforcement. Prerequisites: CrJ. 251 and 252 or consent of the instructor.

310. **Criminalistics. 4 hours.** Study of the operations undertaken in a crime laboratory to examine and to evaluate evidence in criminal and civil investigations. Firearms and tool identification, drug and narcotics analyses, serology, microscopy of trace materials, and forensic instrumental analyses. Prerequisite: Completion of Administration of Criminal Justice core curriculum.

312. **Forensic Science. 4 hours.** Introduction to the diverse fields of forensic science: pathology, toxicology, criminal psychology, detection of deception, and document examination; role of the sciences in the administration of criminal justice; examination of the current approaches to the identification of criminal homicide. Prerequisite: Completion of Administration of Criminal Justice core curriculum.

320. **Information and Communication Systems. 4 hours.** Review of the available technology in the communication and information fields, assessment of the introduction and applications of scientific "hardware" and "software" to the administration of criminal justice at all levels. Historical development of the communication and information systems in law enforcement. Prerequisite: Completion of Administration of Criminal Justice core curriculum.

351. **Criminal Law I: Substantive Criminal Law. 3 hours.** This course is required in the curriculum in the administration of criminal justice but cannot be substituted for a criminal law course taken by law students. General doctrines of criminal liability in the United States; classification of crimes as against persons, property, and the public welfare. Emphasis on the concept of governmental sanctions of the conduct of the individual. Prerequisite: Junior standing or consent of the instructor.

352. **Criminal Law II: Criminal Procedure. 3 hours.** This course is required in the curriculum in the administration of criminal justice but cannot be substituted for a criminal law course taken by law students. The criminal process. Legal problems associated with the investigation of crime, the acquisition of evidence, the commencement of a criminal proceeding, the prosecution and defense of charges, sentencing and appeal. Principle concern is with the development of existing procedures and examination of current efforts for reform. Prerequisite: CrJ. 351 or consent of the instructor.

353. **Criminal Law III: The Instrumentalities of Criminal Justice. 3 hours.** This course is required in the curriculum in the administration of criminal justice but cannot be substituted for a criminal law course taken by law students. Continues CrJ. 352. Examination of the agencies which play significant roles in the criminal process. Functions of the law enforcement agency, counsel, and the courts. Par-

ticular emphasis on the responsibilities and interrelationships of the agencies examined. Prerequisite: CrJ. 352 or consent of the instructor.

ANTHROPOLOGY

102. Introduction to Archaeology. 4 hours. General survey of world archaeology; special reference to origins and development of Old World cultures.

103. Introduction to Social Anthropology. 4 hours. Survey of selected cultures of the world; emphasis on the concepts and methods of ethnology and social anthropology.

104. Introduction to Physical Anthropology. 4 hours. Human origins and development; emphasis on fossil man and races.

160. Human Biology I. 5 hours. Same as BioS. 160. Survey of the structure and functions of the human body; interrelationship of the various organ systems. Lecture and laboratory. Prerequisite: One year of biological sciences or consent of the instructor. **F**

161. Human Biology II. 5 hours. Same as BioS. 161. Continues Anth. 160. Prerequisite: Anth. 160. **W**

221. Cultural Evolution. 4 hours. A critical review of theories of cultural evolution; an examination of ethnographic materials and data on cultural change and cultural contact for the purpose of examining the mechanisms of change. Prerequisite: Anth. 102 or 103 or consent of the instructor. **W**

250. Old World Archaeology. 4 hours. Introduction to the Paleolithic, Mesolithic, and Neolithic eras of Eurasia and Africa; emphasis on the development and spread of prehistoric cultures. Prerequisites: Anth. 102 and 103 or consent of the instructor. **F**

251. New World Archaeology. 4 hours. Introduction to the prehistoric cultures of the New World; chosen areas of emphasis. Prerequisites: Anth. 102 and 103 or consent of the instructor. **W**

252. Prehistory of the Near East. 4 hours. Consideration of southwestern Asia and northeastern Africa as the core area in which the first civilizations emerged. Emphasis on the late Quarternary to about 3000 B.C.; the interrelationships between changing environment, human ecology, and cultural evolution. Prerequisite: Anth. 102. **W**

263. Ethnography of Africa. 4 hours. Culture areas of sub-Saharan Africa; study, in the ethnographic present, of societies typical of each culture area. Prerequisite: Anth. 103 or consent of the instructor. **F**

264. Ethnography of North America. 4 hours. A survey of the indigenous cultures of the Indians of North America, including some studies in culture contact. Prerequisite: Anth. 103 or Soc. 100 or consent of the instructor. **F**

265. Ethnography of South America. 4 hours. Indigenous cultures of South America in the ethnographic present. Prerequisite: Anth. 103 or consent of the instructor. W

266. Ethnography of Meso-America. 4 hours. Preconquest civilization of Meso-America; interaction of Spanish and indigenous cultures; the present Indian cultures of this area. Prerequisite: Anth. 103 or consent of the instructor. W

273. Kinship and Social Structure. 4 hours. Introduction to the study of social systems, with particular reference to kinship systems, lineage organizations, and collateral groupings as they structure social organization in primitive societies. Prerequisite: Anth. 103 or consent of the instructor. F, S

274. Kinship, Family, and Household. 4 hours. Introduction to the comparative study of institutions of marriage, kinship, and household and the extension of kinship norms and values to other aspects of culture and society. Prerequisite: Anth. 273 or consent of the instructor. F

277. Language and Culture. 4 hours. An introductory course stressing language as an aspect of culture, the influence of culture on language, and the cultural role of semantic ambiguity. The problems of language in ethnographic field research and problems of translation between cultures. Prerequisite: Anth. 103 or consent of the instructor. F

295. Seminar in Anthropology. 2 to 4 hours. May be repeated for a total of 8 hours. Reading, study, and discussion of selected problems in anthropology. Prerequisites: Senior standing and anthropology major or anthropology minor and consent of the department. W, S

299. Honors Course. 4 hours. May be repeated for an additional 4 hours. Individual study or research projects. Prerequisites: Senior standing, anthropology major, and 4.00 all-University average; or consent of the instructor. F, W, S

301. Prehistoric Archaeology. 4 hours. Archaeological field techniques and principles of the study of prehistory. Case studies from selected areas of the Old and New Worlds. Prerequisites: Anth. 102 and 250 or 251. S

302. Biological Anthropology. 4 hours. Review and elaboration at an advanced level of the principles of physical anthropology. Human evolution, genetics and race, anthropometry and functional anatomy, growth, constitution, and behavior. Prerequisites: Anth. 104 and one year of biological science or consent of the instructor. F

311. Cultural Problems in Urbanization. 4 hours. Processes of urbanization and of cultural and societal adjustments to urban life. Case studies will illustrate the variety of adjustments to urban life. Prerequisite: Anth. 273 or consent of the instructor.

315. Problems in the Dynamics of Culture. 4 hours. Advanced work in the field of culture change; emphasis on the concepts of acculturation, culture contact, diffusion, and the processes of adaption and reaction. Prerequisite: Anth. 103 or consent of the instructor. F

316. **Economic Life of Primitive Peoples. 4 hours.** Patterns of production, distribution, and consumption in non-Western cultures. Cultural variation in attitudes toward labor; concepts of property, prestige, and wealth. Prerequisite: Anth. 103 or consent of the instructor. **W**

317. **The Cross-Cultural Study of Social Control. 4 hours.** An examination of cultural-jural structures in non-Western societies: modes of dispute settlement, the nature and range of sanctions, processes of social control. Prerequisites: Anth. 103 and consent of the instructor. **F**

320. **Culture and Personality. 4 hours.** An introduction to the concepts, theories, and techniques of studies relating the psychology of the individual to his culture; the results of some of these studies in selected nonliterate societies. Prerequisites: Junior standing, Anth. 103, and an introductory course in psychology, or consent of the instructor. **F**

327. **Primitive Political Systems. 4 hours.** Examination of data and theory pertinent to non-Western political systems. Cross cultural study of political behavior. Prerequisites: Anth. 273 and junior standing, or consent of the instructor.

331. **Human Evolution. 4 hours.** Same as BioS. 331. Phylogeny of the primate order and the problems of speciation; particular emphasis on the relative roles of culture and nature as selective forces in human evolution. Prerequisite: Anth. 104 or one year of biological sciences. **S**

361. **Problems in Meso-American Ethnology. 4 hours.** Intensive investigation of selected problems; special emphasis on religion, economics, and social organization. Prerequisites: Anth. 103, 266, and reading knowledge of Spanish, or consent of the instructor. **S**

363. **Early Civilization of the Old World. 4 hours.** A study of early civilization and incipient urbanization in Eurasia and Africa focusing on the development of urban centers and archaic states with attention to preconditioning factors in the post-Pleistocene, Mesolithic, and Neolithic Ages. Prerequisites: Anth. 252 and 273 or consent of the instructor. **S**

364. **Problems in North American Ethnology. 4 hours.** Intensive reading and research focusing on special problems of religious, economic, and social systems of New World native peoples. Prerequisites: Anth. 103 and 264 or consent of the instructor. **W**

365. **Peoples of the Pacific. 4 hours.** An ethnological survey of the indigenous peoples of Micronesia, Polynesia, Melanesia, and Australia; special emphasis on the social, economic, and religious life of representative groups. Prerequisites: Junior standing and 8 hours of sociology or anthropology or consent of the instructor. **F**

368. **Problems in European Ethnology. 4 hours.** Advanced reading and research in the ethnology of rural Europe; study in depth of selected case materials. Emphasis on community structure; kinship, religious, and economic systems; methods of social control. Research techniques and the nature of source materials. Prerequisites: Anth. 103 and 273. **S**

375. Comparative Religious Movements. 4 hours. Analysis of religious behavior; special reference to the emergence of messianic cults in Africa and Melanesia and among North American Indians and New World Negroes. Prerequisites: Junior standing; 8 hours of anthropology or sociology, or consent of the instructor. S

380. Comparative Study of Sedentary Village Cultures. 4 hours. Research and reading in the comparative ethnology of sedentary villagers in diverse regions of the world; special emphasis, in lecture and discussion, on the critical review of the anthropological literature delineating and defining the characteristics of a peasant stratum of social organization. Prerequisites: Senior standing and 8 hours of anthropology or sociology or consent of the instructor. W

390. Urban Cultures of Africa. 4 hours. Lectures, research, and reading on the indigenous urban centers of sub-Saharan Africa; the multicultural and multiracial metropolitan areas of colonial and contemporary Africa. Special reference to the processes of segregation and detribalization. Prerequisite: Anth. 263 or 391 or consent of the instructor. W

391. Peoples of Africa. 4 hours. Indigenous cultures of Africa: investigation of native African cultures as reconstructed coterminous with early historical contacts with the Western world; some additional data on present-day African cultures. Prerequisites: Junior standing and Anth. 103 or consent of the instructor. S

399. Independent Study. 2 to 4 hours. May be repeated for credit. Under the supervision of a staff member. Prerequisite: Junior standing and permission of the department.

ARCHITECTURE

101. Architectural Design I. 6 hours. Architectural design problems with emphasis on the development and organization of space. Prerequisite: A & A 104.

102. Architectural Design II. 6 hours. Architectural design problems; emphasis on structure. Prerequisite: Arch. 101.

111. Building Technology I. 4 hours. Wood and masonry construction and allied materials. Prerequisite: Concurrent registration in Arch. 102.

121. Statics and Strength of Materials I. 3 hours. Equilibrium of bodies and systems subjected to parallel, colinear, parallel noncolinear, perpendicular, and general systems of concentrated forces. Distributed bonds, centroids, buoyancy, friction. Prerequisites: Math. 111 and 112.

122. Statics and Strength of Materials II. 3 hours. Stresses and strains in tension and compression; moment of inertia; torsion; bending; shear and moment diagrams; stresses in beam; combined bending and aerial load. Prerequisite: Arch. 121.

123. Statics and Strength of Materials III. 3 hours. Deflection of beams; statical indeterminancy; columns variation of stress and strain at a point; ultimate load, failure and safety. Prerequisite: Arch. 122.

201. Architectural Design III. 6 hours. Architectural design problems; emphasis on environment control. Prerequisite: Arch. 102.

202. Architectural Design IV. 6 hours. Comprehensive design problem incorporating site planning. Prerequisite: Arch. 201.

203. Architectural Design V. 6 hours. Comprehensive design problems. Prerequisite: Arch. 202.

204. Architectural Design Problems. 6 hours. Comprehensive design problems. Prerequisite: Arch. 203.

211. Building Technology II. 4 hours. Steel construction and allied materials. Prerequisite: Arch. 111.

212. Building Technology III. 4 hours. Concrete materials and allied construction. Prerequisite: Arch. 211.

213. Building Technology IV. 4 hours. Electricity, illumination, and acoustics. Prerequisite: Arch. 212.

214. Building Technology V. 4 hours. Mechanical equipment, sanitation, heating and air conditioning. Prerequisite: Arch. 213.

215. Building Technology VI. 4 hours. Comprehensive architectural problem. Prerequisites: Arch. 214 and concurrent registration in Arch. 204.

221. Structural Engineering I. 3 hours. Loads on buildings. Algebraic and graphical analysis of beams and trusses. Sloping beams. Statically determinate space structures. Cable systems. Prerequisite: Arch. 123.

222. Structural Engineering II. 3 hours. Approximate analysis of frames. Moment distribution method. Energy principles. Model analysis. Prerequisite: Arch. 221.

223. Structural Engineering III. 3 hours. Foundation types and design. Design of masonry and timber structures. Prerequisite: Arch. 221.

224. Structural Engineering IV. 3 hours. Steel structures; properties of steel, design of tension members; columns; beams and connections. Design of steel buildings; roof trusses and rigid frames. Prerequisite: Arch. 222.

225. Structural Engineering V. 3 hours. Concrete structures; properties of concrete and steel; design of columns, beams, slabs, two-way slabs, flat slabs, walls and foundations. Prerequisite: Arch. 222.

226. Structural Engineering VI. 3 hours. General problems in the selection and design of structural systems for buildings; structural design with aluminum, plastics, and other materials; elements of prestressed concrete; ultimate and plastic design; unconventional structural types. Prerequisites: Arch. 223, 224, and 225.

231. Ancient Architecture. 3 hours. The development of the architecture of the ancient East, Greece, and Rome. Prerequisite: A & A 144.

232. **Medieval Architecture. 3 hours.** The development of Early Christian, Byzantine, Romanesque, and Gothic architecture. Prerequisite: A & A 144.

233. **Renaissance and Baroque Architecture. 3 hours.** The development of European architecture from 1440 to 1750. Prerequisite: A & A 144.

234. **American Architecture. 3 hours.** Development of architecture in colonial America and the United States from 1620 to 1900. Prerequisite: A & A 144.

235. **European Architecture from 1750 to 1900. 3 hours.** Prerequisite: A & A 144.

236. **Twentieth Century Architecture. 3 hours.** The development of architecture in Europe and the United States from 1900 to the present. Prerequisite: A & A 144.

237. **Japanese Architecture. 3 hours.** Survey of Japanese architecture to the present. Prerequisite: A & A 144.

238. **Pre-Columbian Architecture. 3 hours.** Architecture of North, Central, and South America before 1500. Prerequisite: A & A 144.

241. **Urban and Regional Planning I. 3 hours.** Man's efforts to shape the physical environment of his community. Contemporary methods of controlling urban development.

242. **Urban and Regional Planning II. 3 hours.** Historical perspective. Prerequisite: Arch. 241.

301. **Architectural Design VII. 3 to 6 hours.** Comprehensive architectural problems. Prerequisite: Arch. 204.

302. **Architectural Design VIII. 3 to 6 hours.** Comprehensive architectural problems. Prerequisite: Arch. 301.

309. **Architectural Design Thesis. 12 hours.** Individual problems specializing in architectural design. Prerequisite: Arch. 302.

311. **Forensic Architecture. 3 hours.** Legal problems in architecture. Prerequisite: Fifth year/senior standing.

312. **Computer Analysis. 3 hours.** The use of electronic computers in building design and construction. Prerequisite: Arch. 226.

313. **Building Construction Systems. 6 hours.** Framing systems and components. Prerequisite: Arch. 215.

314. **Industrialized Building. 3 hours.** Prefabrication of building components. Prerequisite: Fifth year/senior standing.

315. **Logistics of Building Construction. 3 hours.** Problems encountered in studying the logistics of building construction. Prerequisite: Fifth year/senior standing.

316. **Environmental Control Systems. 6 hours.** Problems of color, illumination, heating and air conditioning systems, acoustics. Prerequisite: Fifth year/senior standing.

319. **Building Technology Thesis. 12 hours.** Individual problems in building technology. Prerequisites: Arch. 215; 12 hours from Arch. 311 through 316.

321. **Foundations. 3 hours.** Elements of soil mechanics; the selection and design of pile, caisson, raft, and other foundations. Prerequisite: Arch. 226.

322. **Structural Seminar I. 3 hours.** Selected topics in structural analysis and design. Prerequisite: Arch. 226.

323. **Intermediate Structural Analysis. 6 hours.** The analysis of statically indeterminate coplanar and space structures. Prerequisite: Arch. 226.

324. **Structural Dynamics. 3 hours.** Vibration, wind, and earthquake analysis and design of buildings. Prerequisite: Consent of the instructor.

325. **Structural Seminar II. 3 hours.** Continues Arch. 322. Prerequisite: Arch. 226.

326. **Intermediate Structural Design. 6 hours.** Plastic and limit methods of design, ultimate strength design, design of prestressed concrete members and structures. Prerequisite: Arch. 226.

329. **Structural Thesis. 12 hours.** Individual problems in structures. Prerequisite: Arch. 226.

331. **Seminar. 3 hours.** May be repeated for a maximum of 9 hours. Current problems in architecture. Prerequisite: 9 hours in the history of architecture.

332. **Reading Course. 3 hours.** May be repeated for a maximum of 9 hours.

333. **Literature, Theory, and Criticism. 3 hours.** Selected readings and discussion of significant writers on architecture.

334. **Chicago Building. 3 hours.** Architectural and technical history of Chicago's commercial buildings from 1871 to the present. Prerequisite: 9 hours in Architecture 231 through 238.

335. **Frank Lloyd Wright and his Contemporaries, 1890-1910. 3 hours.** First-hand study of Wright's domestic buildings in the Chicago area and his relationship to other members of the "Prairie School" of Midwest architecture. Lecture, discussion and field trips. Prerequisite: 9 hours in Architecture 231 through 238.

336. **Seminar: Dankmar Adler and Louis H. Sullivan. 3 hours.** Critical study of Chicago's foremost architectural partnership, their monuments, theories and practice. Prerequisite: Architecture 334.

339. **History of Architecture Thesis. 12 hours.** Individual problems in the history of architecture. Prerequisites: 21 hours in the history of architecture; Arch. 231 through 238, Arch. 331, 332, 333.

343. **Professional Practice. 3 hours.** Problems related to the practice of architecture. Prerequisite: Fifth year/senior standing.

ARCHITECTURE AND ART

101. **Basic Design I. 3 hours.** The basic factors in two-dimensional and three-dimensional design.

102. **Basic Design II. 3 hours.** More complex systems of two-dimensional and three-dimensional design. Introduction to color theory. Prerequisite: A & A 101.

103. **Basic Design III. 3 hours.** Theory and application; form and structure; three-dimensional models of systems. Prerequisite: A & A 102.

104. **Basic Design IV. 3 hours.** Theory of architectural design with elementary problems of application emphasizing problem analysis and programming. Prerequisite: A & A 103.

105. **Basic Design V. 3 hours.** Kinetic development of form, space, time, and movement devices. Prerequisite: A & A 104.

106. **Basic Design VI. 3 hours.** A sustained project involving the application of principles studies in A & A 104 and 105 with experimentation in various media. Prerequisite: A & A 105.

111. **Visual Communications I. 2 hours.** An introduction to the techniques.

112. **Visual Communications II. 2 hours.** Continues A & A 111. Prerequisite: A & A 111.

113. **Visual Communications III. 2 hours.** Symbolic systems, image forming, and typography. Prerequisite: A & A 112.

114. **Visual Communications IV. 2 hours.** Experimentation with the techniques and materials, including photography, used in two-dimensional expression. Prerequisite: A & A 113.

115. **Visual Communications V. 2 hours.** Communication of events or visual ideas in photography or cinematography. Prerequisite: A & A 114.

116. **Visual Communications VI. 2 hours.** Creative project involving application of ideas and techniques studied in A & A 114 and 115. Prerequisite: A & A 115.

141. **Man and Environment. 3 hours.** An introduction to the nature of the professions of architecture and art in terms of the subjective and objective factors of architectural activity.

142. **History of Architecture and the Arts I. 3 hours.** An introduction to the methodology of art and architectural history and criticism.

143. History of Architecture and the Arts II. 3 hours. A cultural-historical oriented examination of architecture and art from antiquity through medieval times. Prerequisite: A & A 142.

144. History of Architecture and the Arts III. 3 hours. Continues A & A 143. A cultural-historical examination of architecture from the Renaissance to the present. Prerequisite: A & A 143.

ART

115. Introduction to an Understanding of Art History. 3 hours. Introduction to the hypothesis of art. Visual analysis; analysis of style; study of iconology; sociology and art; economics of art; psychology of art; criticism; the artist's role in history.

204. Art for Elementary Teachers: Studies in Creativity. 4 hours. Opportunity for the elementary education major to understand the creative process through this experience in art. Prerequisite: Junior standing.

205. Foundations of Art Education. 5 hours. Study of methods and techniques of art teaching emphasizing creative and artistic development, and the application of psychological and educational theories and practices to the teaching of art. Lecture, demonstrations, laboratory investigation. Prerequisites: Ed. 170 and 210.

213. Art Education Theory. 3 hours. Problem solving evaluation and survey of pertinent studies and theories in art education. Prerequisite: Credit or concurrent registration in Art 205.

ART HISTORY

205. Prehistoric Art. 3 hours. Selected examples of painting, sculpture, and architecture; development and diffusion of style and iconography. Analogies in the history of ideas, events, technical change; other pertinent material. Prerequisites: A & A 142 or Art 115; A & A 143 and 144.

206. History of Renaissance Painting and Sculpture. 3 hours. Development of Renaissance painting and sculpture in western Europe; related material. Prerequisites: A & A 142 or Art 115; A & A 143 and 144; or consent of the instructor.

207. History of Baroque Painting and Sculpture. 3 hours. Development of Baroque painting and sculpture; related material. Prerequisites: A & A 142 or Art 115; A & A 143 and 144; or consent of the instructor.

208. History of Nineteenth Century Painting and Sculpture. 3 hours. Development of nineteenth century painting and sculpture in western Europe and North America; related material. Prerequisites: A & A 142 or Art 115; A & A 143 and 144; or consent of the instructor.

209. **History of Twentieth Century Painting and Sculpture. 3 hours.** Development of twentieth century painting and sculpture in western Europe and North America; related material. Prerequisites: A & A 142 or Art 115; A & A 143 and 144; or consent of the instructor.

210. **History of American Painting and Sculpture. 3 hours.** Selected examples; development and diffusion of style and iconography. Analogies in the history of ideas, events, technical change; other pertinent material. Prerequisite: 15 hours of art history.

211. **Early Christian and Byzantine Art. 3 hours.** Art and architecture of the Latin West and the Greek East from the Age of Constantine through the First Golden Age of Byzantine art under Justinian. Prerequisite: A & A 144 for students in Architecture and Art; Art 115 or A & A 142 for others.

212. **Early Medieval Art. 3 hours.** Art and architecture of western Europe from the seventh century through early Romanesque; special attention to the character of the Carolingian and Ottoman revivals of antiquity. Prerequisite: A & A 144 for students in Architecture and Art; Art 115 or A & A 142 for others.

213. **Medieval Art from 1100 to 1400. 3 hours.** Painting, sculpture, architecture, and the decorative arts from developing Romanesque to High Gothic; special attention to developments north of the Alps. Prerequisite: A & A 144 for students in Architecture and Art; Art 115 or A & A 142 for others.

214. **Northern Renaissance Art. 3 hours.** The art of the Lowlands; special attention also to illuminated manuscripts and panel painting in France, Germany, and England during the fifteenth and sixteenth centuries. Prerequisites: A & A 144 for students in Architecture and Art; Art 115 and A & A 143 for others.

215. **Art History Tutorial. 3 hours.** Small group instruction in the methodology of art history. Application to selected problems in the field. Readings and discussion of the fundamental literature of art history. Prerequisite: Junior standing.

217. **Art of the Ancient Near East. 3 hours.** The art and architecture of Egypt, western Asia, and the Aegean lands during the third and second millenia B. C. Prerequisites: A & A 144 for students in Architecture and Art; Art 115 and A & A 142 for others.

218. **Greek Art and Archaeology. 3 hours.** Art and architecture of Greece from the Archaic through the Classical and early Hellenistic periods. Prerequisites: A & A 144 for students in Architecture and Art; Art 115 and A & A 142 for others.

219. **Roman Art and Archaeology. 3 hours.** Art and architecture of Rome and the Roman Empire from the Republic to the Late Antique era. Prerequisites: A & A 144 for students in Art and Architecture; Art 115 and A & A 142 for others.

220. **The Art of China. 3 hours.** Painting, sculpture, and related arts from the Neolithic era through the eighteenth century. Prerequisite: A & A 144 for students in Architecture and Art; Art 115 or consent of the instructor for others.

221. **The Art of Japan. 3 hours.** Architecture, sculpture, painting, and related arts from the Neolithic period to the nineteenth century. Prerequisite: A & A 144 for students in Architecture and Art; Art 115 or consent of the instructor for others.

222. **The Art of India and Southeast Asia. 3 hours.** Architecture, sculpture, painting, and related arts of India and Further India from the Indus Valley civilization to the Mughals. Prerequisite: A & A 144 for students in Architecture and Art; Art 115 or consent of the instructor for others.

302. **Modern Painting. 3 hours.** Selected examples; development and diffusion of style and iconography. Analogies in the history of ideas, events, technical change; other pertinent material. Prerequisite: AH 209.

303. **Modern Sculpture. 3 hours.** Selected examples; development and diffusion of style and iconography. Analogies in the history of ideas, events, technical change; other pertinent material. Prerequisite: AH 209.

305. **Special Studies in Art History. 3 hours.** Individually planned reading and study programs on special problems, under supervision of a staff member. Prerequisite: 15 hours of art history.

306. **Studies in Art Criticism and Theory. 3 hours.** Selected problems. Prerequisite: Senior standing or 15 hours of art history.

307. **Contemporary Art. 3 hours.** Most recent developments; production and theory. Prerequisite: AH 209.

BIOLOGICAL SCIENCES

100. **General Biology. 4 hours.** Same as InfE. 100. With BioS. 101 and 102, a three-quarter sequence which may be entered in any quarter. Audio-tutorial. Principles and fundamentals of biology through examination of diverse phenomena unique to biological systems. Lecture, laboratory, and discussion. **F, Su**

101. **General Biology. 4 hours.** Same as InfE. 101. See BioS. 100. W

102. **General Biology. 4 hours.** Same as InfE. 102. See BioS. 100. S

160. **Human Biology I. 5 hours.** Same as Anth. 160. Survey of the structure and functions of the human body; interrelationships of the various organ systems. Lecture and laboratory. Prerequisite: One year of biological sciences or consent of the instructor. **F**

161. **Human Biology II. 5 hours.** Same as Anth. 161. Continues BioS. 160. Prerequisite: BioS. 160. **W**

193. **Honors Biology. 1 hour.** Open only to freshmen, sophomores, and juniors. An additional hour of related work for students registered in a course in biological sciences. May be repeated for 1 hour each quarter. Prerequisites: James Scholar

status or permission of the department for superior students, registration in a biological sciences course (except BioS. 299 or 300). **F, W, S**

200. History of Biology. 3 hours. Major problems and suggested solutions from the earliest records to the present. Prerequisite: Four quarters of laboratory science. **F**

205. Microtechnique. 4 hours. Various methods of preparing animal and plant tissue for microscopic examination. Includes techniques and basic theories related to differential staining, histochemical and cytochemical reactions, and electron microscopy. Lecture and laboratory. Prerequisite: One year of biological sciences. **W**

210. Selected Ideas in Regulatory Biology. 4 hours. Topics will be chosen to illustrate the basic unifying principles in the biological sciences; emphasis on processes of biological thought. Lecture and laboratory. Prerequisites: One year of biological sciences and senior standing or consent of the instructor. **F**

211. Selected Ideas in Evolutionary Biology. 4 hours. Topics will be chosen to illustrate the basic unifying principles in the biological sciences; emphasis on processes of biological thought. Lecture and laboratory. Prerequisites: One year of biological sciences and senior standing or consent of the instructor. **S**

218. Introduction to Paleontology. 4 hours. Same as Geol. 218. The phylogeny, morphology, and ecology of fossils; emphasis on the invertebrates. Prerequisite: One year of biological sciences or consent of the instructor. **F**

220. Plant Taxonomy. 4 hours. Classification and identification of flowering plants; emphasis on local flora. Lecture, laboratory, and occasional field trips. Prerequisite: One year of biological sciences. **S**

230. Biology of Nonvascular Plants. 4 hours. Structure and function in representative algae, fungi, slime-molds, and bryophytes in relation to their life cycles and phylogeny. Lecture and laboratory. Prerequisite: One year of biological sciences. **F**

232. Plant Growth and Differentiation. 4 hours. A study of the developmental sequences in respect to time, light, temperature, and nutrition of selected vascular and nonvascular plants. Lecture and laboratory. Prerequisite: One year of biological sciences.

240. General Genetics. 5 hours. Same as InfE. 283. Principles of heredity and variation illustrating the gene concept. Examples include animal, plant, microorganism, and human heredity. Lecture, laboratory, and recitation. Prerequisite: One year of biological sciences. Math. 104, 105, and 130, and organic chemistry are recommended. **F, W, S, Su**

250. General Microbiology. 5 hours. Introduction to the principal activities and properties of microorganisms, emphasizing fundamental concepts. Lecture and laboratory. Prerequisites: One year of biological sciences and credit or registration in organic chemistry. **W. Su**

260. **Biology of Human Reproduction. 3 hours.** Study of the anatomy and physiology of the human reproductive system. Lecture. Prerequisite: One year of biological sciences. **F, S**

261. **Cellular Biodynamics. 5 hours.** Same as InfE. 284. The basic physiological activities common to cells; study of the functions characteristic of specialized cell types. Lecture and laboratory. Prerequisite: One year of biological sciences. **F, W, S, Su**

280. **Vertebrate Morphogenesis. 5 hours.** Same as InfE. 280. An introduction to vertebrate anatomy with emphasis on early embryology and histology. Lecture and laboratory. Prerequisite: One year of biological sciences. **F, Su**

281. **Structure and Development of Vertebrates I. 5 hours.** Same as InfE. 281. With BioS. 282, a two quarter sequence. Evolution of vertebrate organ systems; their embryogenesis and microscopic and gross anatomy. Lecture and laboratory. Prerequisite: BioS. 280. **W**

282. **Structure and Development of Vertebrates II. 5 hours.** Same as InfE. 282. Continues BioS. 281. Prerequisite: BioS. 281. **S**

299. **Individual Topics. 3 to 5 hours.** For qualified students wishing to carry out individual problems. Laboratory, conferences, and assigned readings. Prerequisites: Senior standing and permission of the department. **F, W, S**

300. **Seminar. 0 to 1 hour.** Faculty and visiting biologists discuss results of their research programs before staff and students at weekly meetings. Biological sciences majors must enroll for two quarters in their senior year; one hour of credit will be given at the completion of the second quarter. Attendance of majors at all meetings is strongly encouraged. Prerequisites: Biological sciences major, junior standing. **F, W, S**

304. **Instrumentation in Cell and Tissue Study. 3 hours.** Advanced cytology; emphasis on instrumental methods. Modern biophysical techniques. Prerequisites: Phys. 102, Chem. 134, BioS. 261, and concurrent registration in BioS. 309, or consent of the instructor. **F**

305. **Biostatistics. 3 hours.** A training course, for future professional biologists, in those statistical methods most useful in the design and analysis of biological investigations. Lecture and laboratory. Prerequisite: 20 hours of biological sciences or consent of the instructor.

307. **Biological Methods for Teachers. 2 hours.** The investigation of methodological subjects, conducted primarily as a practicum; emphasis on the development of competencies. Prerequisite: Senior standing; 40 hours of biological sciences. **W**

309. **Cytology. 3 hours.** Structure and function of cells as revealed through historical development and modern research techniques. Lecture. Prerequisite: Two years of biological sciences. **F**

313. **Developmental Biology.** 4 hours. Principles governing growth and differentiation at molecular, fine structural, cellular, and organismic levels. Lecture and laboratory. Prerequisite: One year of biological sciences. **F**

315. **Principles of Ecology.** 3 hours. Composition and distribution of biotic communities, plant and animal; emphasis on the interplay of physical and biological factors of the environment. Prerequisite: One year of biological sciences and concurrent registration in BioS. 324 or 380. **F, S**

316. **Invertebrate Paleontology.** 4 hours. Same as Geol. 316. Phylogeny, morphology, and ecology of the fossil invertebrates. Prerequisites: BioS. 218 and consent of the instructor. **F**

318. **Vertebrate Paleontology.** 4 hours. Same as Geol. 318. Phylogeny, morphology, and ecology of the fossil vertebrates. Prerequisites: One year of biological sciences and consent of the instructor. **S**

319. **Paleobotany.** 4 hours. Same as Geol. 319. Structure, phylogeny, and stratigraphic distribution of representative fossil plants. Lecture, laboratory, and field trips. Prerequisite: One year of biological sciences. **F**

320. **Field Botany.** 5 hours. Flora and vegetation of the Chicago region. Lecture, laboratory, and field trips. Prerequisite: One year of biological sciences. **Su**

321. **Plant Geography of North America.** 4 hours. Ecological and systematic treatment of vegetation regions and principal subdivisions; emphasis on environmental factors and floras. Prerequisite: BioS. 220 or 315. **W**

324. **Plant Ecology Laboratory.** 2 hours. Special attention to vegetation and environment of the Chicago region. Laboratory and field trips. Prerequisite: Concurrent registration in BioS. 315. **F, S**

328. **Plant Physiology I.** 5 hours. Plant relations to water and solutes; translocation; inorganic plant nutrition; photosynthesis; respiration. Lecture and laboratory. Prerequisite: One year of biological sciences. **W**

329. **Plant Physiology II.** 5 hours. Intensive study of the metabolism of carbon and nitrogen compounds and the physiology of growth and development. Lecture and laboratory. Prerequisite: BioS. 328 or consent of the instructor. **S**

331. **Human Evolution.** 4 hours. Same as Anth. 331. Phylogeny of the primate order and the problems of speciation; particular emphasis on the relative roles of culture and nature as selective forces in human evolution. Prerequisite: One year of biological sciences or Anth. 104. **F, S**

333. **Morphology of Vascular Plants.** 4 hours. The structure, reproduction, and evolutionary history of representative vascular plants—psilopsids, lycopsids, sphenopsids, ferns, gymnosperms, and angiosperms. Lecture and laboratory. Prerequisite: One year of biological sciences. **W**

342. **Cytogenetics. 4 hours.** Chromosomal phenomena involved in the mechanics of genetics, structure of genetic material, and the role chromosomal variation plays in the evolution of races and species. Lecture and laboratory. Prerequisite: BioS. 240. **F**

343. **Population Genetics. 3 hours.** Genetic dynamics for animal, plant, and human populations: mating systems, selection, sampling, and mutation. Lecture and recitation. Prerequisites: BioS. 240, Math. 130, and credit or concurrent registration in statistics, or consent of the instructor.**W**

344. **Experimental Population Genetics. 3 hours.** Discussion of experimental and field empirical studies estimating genetic parameters, influence of selection, and other evolutionary forces on genotypes in populations. Lecture, laboratory, and discussion. Prerequisite: BioS. 343. **S**

345. **Systematics and Evolution. 3 hours.** Consideration of principles and interrelationships; basic analysis of evolutionary mechanisms; rationale for classification systems; nature of taxonomic characters. Lecture and discussion. Prerequisites: One year of biological sciences and BioS. 240. **W**

348. **Experimental Plant Systematics. 4 hours.** Evolutionary mechanisms and pathways in higher plants; analysis of genetic, chromosomal, morphological, and physiological properties of natural assemblages at and below the species level of divergence. Lecture and laboratory. Prerequisite: BioS. 349.

349. **Evolutionary Theory. 3 hours.** Analysis of evolutionary mechanisms in plants and animals; variation and differentiation in populations and species; origins of superspecific taxa. Prerequisites: BioS. 240, 315, and 345. **W**

350. **Advanced Microbiology. 5 hours.** Modern contributions to the cellular anatomy, physiology, and genetics of microorganisms. Lecture and laboratory. Prerequisites: BioS. 250 or 261 and credit or registration in biochemistry. Calculus is strongly recommended. **F**

353. **Chemical Biogenesis. 3 hours.** Same as Chem. 353. Biosynthesis of important biological compounds. Lecture and discussion. Prerequisite: Chem. 134 or 234. **W**

356. **Mycology. 4 hours.** Analysis of the morphology, physiology, and genetics of fungi, as related to the taxonomy and phylogeny of fungi. Lecture and laboratory. Prerequisite: One year of biological sciences. **F**

361. **Macromolecules of Biological Importance. 5 hours.** Study of the nucleic acids and proteins; emphasis on their roles in the replication of genetic material. Lecture and laboratory. Prerequisites: A course in organic chemistry and consent of the instructor. **S**

363. **Animal Physiology I. 5 hours.** Same as InfE. 383. The role of the digestive, circulatory, respiratory, and osmoexcretory systems in the maintenance of organismic homeostasis. Emphasis on vertebrates. Lecture and laboratory. Prerequisite: BioS. 261. **F, Su**

364. **Animal Physiology II.** 5 hours. Same as InfE. 384. The role of the muscular, sensory, nervous, and endocrine systems in the maintenance of organismic integration. Emphasis on vertebrates. Lecture and laboratory. Prerequisite: BioS. 261. W

377. **Endocrinology.** 5 hours. The animal hormones in the control of integration, homeostasis, growth, and development. Lecture and laboratory. Prerequisite: BioS. 364. W

380. **Animal Ecology Laboratory.** 2 hours. Population and community assemblages of the Chicago region. Laboratory and field trips. Prerequisite: Concurrent registration in BioS. 315. F, S

382. **Environmental Conservation.** 4 hours. Applied ecology of use of renewable natural resources; special emphasis on biotic problems of land, water, and air management; pollution, population increase, multiple-use concept, and land ethics. Lecture and field trips. Prerequisites: BioS. 315 and 324 or 380. F

384. **Invertebrate Zoology I.** 5 hours. Comparative study of structure, development, behavior, classification, and evolution of the lower invertebrate groups. Lecture and laboratory. Prerequisite: One year of biological sciences. W

385. **Invertebrate Zoology II.** 5 hours. Comparative study of structure, development, classification, and evolution of the higher invertebrate groups exclusive of insects. Lecture and laboratory. Prerequisite: BioS. 384. S

388. **General Entomology.** 5 hours. Introduction to the morphology, physiology, classification, behavior, and evolution of insects. Lecture and laboratory. Prerequisite: One year of biological sciences. F

389. **Principles of Protozoology.** 5 hours. Introduction to the comparative morphology, physiology, and systematics of the protozoa, including discussion of advances in major areas of current research. Lecture and laboratory. Prerequisite: One year of biological sciences. S

393. **Functional Animal Morphology.** 4 hours. Functional analysis of selected invertebrate and vertebrate organ systems applied to problems of comparative structure, adaptation, and phylogeny. Lecture and laboratory. Prerequisites: Senior standing and consent of the instructor. F

395. **Zoogeography.** 3 hours. Examination of the present distribution of animals and discussion of climate, physiographic area, and paleozoologic history as they affect the development of major faunal areas and island populations. Trips to museums, zoos, and aquaria. Prerequisite: Senior standing. W, S

BUSINESS LAW

310. **Managerial Jurisprudence.** 4 hours. Application of the legal function to business administration. Basic legal tools for business transactions; legal aspects of the

major areas of business management. Prerequisite: Junior standing in the College of Business Administration.

CHEMISTRY

111. Introduction to Chemistry. 3 hours. For students without entrance credit in high school chemistry or inadequately prepared for Chem. 112. **W, S, Su**

112. Chemical Bonding and Structure. 4 hours. For students with one year of high school chemistry and adequate preparation, as shown by placement examination. Atomic and molecular structure, chemistry of the covalent and ionic bond. Prerequisite: Chem. 111 or adequate performance on the placement examination. **W, S, Su**

113. Equilibria: Chemistry of Solutions. 4 hours. Acid-base reactions, solubility relations, oxidation potentials; qualitative analysis. Prerequisite: Chem. 112 or superior performance on placement examination or advanced placement or Chem. 117. College algebra or the equivalent is strongly recommended. **W, S, Su**

114. Structure and Reactivity. 4 hours. Elementary thermodynamics and kinetics; electrochemistry. Prerequisite: Chem. 113 or advanced placement. **W, S, Su**

117. General and Analytical Chemistry I. 5 hours. Primarily for students in the chemistry, chemical engineering, and physics curricula and natural science majors. Prerequisite: Superior performance on the placement examination.

118. General and Analytical Chemistry II. 5 hours. Continues Chem. 117. Prerequisite: Chem. 117 with a grade of C or higher. **W**

119. General and Analytical Chemistry III. 5 hours. Credit is not given for Chem. 119 if the student has credit in 121. Continues Chem. 118, with special emphasis on quantitative analysis. Prerequisite: Chem. 118. **S**

121. Analytical Chemistry. 5 hours. Credit is not given for Chem. 121 if the student has credit in 119. Volumetric, gravimetric and instrumental methods of analysis. Prerequisite: Chem. 114 or advanced placement. **W, S, Su**

132. Elementary Organic Chemistry. 5 hours. Primarily for prenursing students. This course does not satisfy the organic chemistry prerequisite for biochemistry or for advanced courses in organic chemistry. Prerequisite: Chem. 112. **W, S, Su**

133. Basic Organic Chemistry I. 4 hours. For students not majoring in chemistry. Structures, synthesis, and reactions of the more important classes of organic compounds. Prerequisite: Chem. 114. **W**

134. Basic Organic Chemistry II. 4 hours. Continues Chem. 133. Prerequisite: Chem. 133. **W, S**

193. General Chemistry for Engineers. 3 hours. A presentation of elementary principles of chemistry. Prerequisite: High school chemistry. W, S, Su

194. Chemistry for Engineers I. 4 hours. For students in the College of Engineering. A concise presentation of the principles of chemistry. Some knowledge of chemistry is assumed. Prerequisites: Sophomore standing in the College of Engineering, Chem. 193 or the equivalent, Math. 132, and Phys. 112 or EnrE. 201. S

195. Chemistry for Engineers II. 4 hours. Continues Chem. 194. Prerequisite: Chem. 194. W, Su

221. The Study of Chemical Systems. 3 hours. For students in the College of Engineering. Theoretical and experimental study of some aspects of the structure, properties, separation, and identification of chemical systems. Prerequisite: Chem. 195 or the equivalent.

233. Organic Chemistry I. 5 hours. For chemistry majors and students in the chemistry and chemical engineering curricula. The first quarter of a three quarter sequence in organic chemistry. Prerequisite: Chem. 114 or 119. W, S, Su

234. Organic Chemistry II. 5 hours. Continues Chem. 233. Prerequisite: Chem. 233. W, S

235. Organic Chemistry III. 3 hours. Continues Chem. 234. Includes such special topics as organic photochemistry, natural products, and organic compounds containing silicon, phosphorus, and boron. Prerequisite: Chem. 234 or permission of the department. W, S, Su

237. Organic Chemistry Laboratory. 2 hours. Includes the opportunity for individual projects. Prerequisite: Registration in Chem. 235. W, S, Su

281. Elements of Glass Blowing. 1 hour. Demonstrations and practice in glass blowing and the construction of simple laboratory equipment. Prerequisites: Junior standing in chemistry and consent of the instructor.

282. Chemical Literature. 1 hour. Survey of chemical information sources and retrial procedures. Prerequisite: 24 hours of chemistry and four quarters (or the equivalent) of German or Russian or French. W, S

285. History of Science, with Particular Reference to Chemistry. 3 hours. The historical development of leading ideas in science and chemistry. Prerequisite: 26 hours of laboratory science. W, S

292. Thesis. 2 to 9 hours. Prerequisites: Senior standing and written permission from
299. the department and from the instructor under whom the student is to work. It is recommended that the student divide his work over two quarters. The last digit of the course number indicates the number of credit hours in the quarter. Total credit in this course must be at least 4 hours and must not exceed 9 hours. To receive credit each student must present a thesis. W, S, Su

315. **Inorganic Chemistry. 4 hours.** Lectures and assigned readings in structural inorganic chemistry, inorganic reaction mechanisms and techniques, and the nature of the coordinate bond. Prerequisite: Chem. 342 or the equivalent. S

316. **Inorganic Chemistry Laboratory. 2 hours.** Synthesis of inorganic compounds illustrating the use of modern preparative techniques. Prerequisite: Credit or registration in Chem. 315.

318. **Inorganic Chemistry. 4 hours.** Lectures and assigned readings on the chemistry of selected elements. Prerequisite: Consent of the instructor.

321. **Chemical and Instrumental Analysis I. 4 hours.** Chemical and instrumental methods of analysis and their application to the quantitative study of chemical reaction. Prerequisites: Chem. 235 and credit or registration in Chem. 343 or the equivalents. W

322. **Chemical and Instrumental Analysis II. 3 hours.** Continues Chem. 321. Prerequisite: Chem. 321. S

326. **Advanced Analytical Chemistry. 4 hours.** Analytical separation and experimental design of analytical methods. Prerequisite: Chem. 322.

338. **Systematic Identification of Organic Compounds. 3 hours.** Primarily a laboratory course; chemical, physical, and spectroscopic methods are used to separate, purify, and identify organic compounds. Prerequisite: Chem. 237. S

339. **Organic Synthesis. 2 to 4 hours.** Discussion and laboratory work involving special techniques in organic synthesis. Prerequisite: Chem. 237 or the equivalent. S

340. **Physical Chemistry I. 3 hours.** Credit is not given for both the Chem. 380-382 sequence and the 340-341-342 sequence. Introduction to the study of chemical principles. Prerequisites: Chem. 119 or 121, credit or registration in Math. 133, and one year of college physics.

341. **Physical Chemistry Laboratory I. 2 hours.** Quantitative experimental study of chemical principles. Prerequisite: Concurrent registration in Chem. 340.

342. **Physical Chemistry II. 3 hours.** Continues Chem. 340. Prerequisite: Chem. 340. W

343. **Physical Chemistry Laboratory II. 2 hours.** Continues Chem. 341. Prerequisites: Chem. 341 and concurrent registration in Chem. 342. W

344. **Physical Chemistry III. 3 hours.** Continues Chem. 342. Prerequisite: Chem. 342. S

345. **Physical Chemistry Laboratory III. 2 hours.** Continues Chem. 343. Prerequisites: Chem. 343 and concurrent registration in Chem. 344. S

347. Introduction to Quantum Chemistry. 4 hours. Applications of quantum mechanics to problems of chemical interest. Additional projects are required. Prerequisite: Chem. 344.

348. Thermodynamics. 4 hours. Lectures and assigned readings on thermodynamics; applications to chemical systems. Prerequisite: Chem. 344. W

349. Statistical Thermodynamics. 4 hours. Introduction to statistical mechanics and application to equilibrium thermodynamics. Individual projects are required. Prerequisite: Chem. 344. S

350. General Biochemistry I. 3 hours. Chemistry of biological systems, including enzymes, vitamins, nucleic acids, carbohydrates, and proteins. Prerequisites: Chem. 119 or 121 and 134 or 234. W, Su

351. General Biochemistry II. 3 hours. Continues Chem. 350. Prerequisite: Chem. 350. S

353. Chemical Biogenesis. 3 hours. Same as BioS. 353. Biosynthesis of important biological compounds. Prerequisite: Chem. 134 or 234. S

355. Biochemistry Laboratory I. 2 hours. An introduction to experimentation with biochemical systems, processes, and compounds of biochemical importance. Prerequisite: Registration in Chem. 350.

357. Biochemistry Laboratory II. 2 hours. Continues Chem. 355. Prerequisites: Chem. 355 and credit or registration in Chem. 351.

361. Advanced Organic Chemistry I. 4 hours. Advanced treatment of general organic reactions; particular emphasis on reaction mechanisms and the relationship between reactivity and structure. Lectures and assigned readings. Prerequisites: Chem. 235 and 344.

362. Advanced Organic Chemistry II. 4 hours. Continues Chem. 361. Lectures and assigned readings. Prerequisite: Chem. 361. W

380. Principles of Physical Chemistry I. 3 hours. Credit is not given for both the Chem. 380-382 sequence and the 340-341-342 sequence. Chem. 380 and 382 provide an elementary introduction to physical chemistry with particular emphasis on topics of importance in the biological and health sciences. Prerequisites: Chem. 119 or 121, calculus, and two quarters of physics, or consent of the instructor. W

382. Principles of Physical Chemistry II. 3 hours. Continues Chem. 380. Prerequisite: Chem. 380. S

383. Elementary Physical Chemistry Laboratory. 1 hour. An introductory laboratory course in physical chemistry. Prerequisite: Chem. 380. S

384. Surface and Macromolecular Chemistry. 3 hours. Interfacial phenomena, stability of disperse systems, properties of polymer solutions. Prerequisites: Chem. 382 or the equivalent and consent of the instructor.

385. **Surface and Macromolecular Laboratory.** 2 hours. Techniques in surface and macromolecular chemistry. Prerequisites: Credit or registration in Chem. 384 and consent of the instructor.

391. **Problems in the Teaching of High School Chemistry.** 4 hours. New approaches to the discussion and presentation of topics in general chemistry. Prerequisite: Experience in teaching high school chemistry.

393. **Topics of Modern Chemistry.** 4 hours. Lectures, demonstrations, discussions, and literature in specialized areas of chemistry, including analytical, inorganic, organic, and physical chemistry and biochemistry. Prerequisite: Consent of the instructor.

399. **Independent Study.** 3 hours. May be repeated for credit. Supervised study in an area not represented by regularly offered courses. Prerequisites: Senior standing and written permission of the department. W, S, Su

CLASSICS

100. **Classical Etymology in the Life Sciences.** 2 hours. The structure and formation of technical terms used in the life sciences. W,S,F

150. **Greek Comedy.** 4 hours. The plays of Aristophanes, read in a variety of modern English translations. Prerequisite: Sophomore standing. S

155. **Roman Comedy.** 4 hours. Knowledge of Latin is not required. The plays of Plautus and Terence. The influence of Roman comedy on modern playwrights. W

165. **Greco-Roman Epic.** 4 hours. Knowledge of Greek and Latin is not required. Homer, Apollonius Rhodius, Lucretius, Vergil, Lucan, and others; their subsequent influence. S

200. **Greek Poetry in Translation.** 4 hours. Knowledge of Greek is not required. Classical Greek poetry from its beginning to the Byzantine period. F

205. **Roman Satire.** 4 hours. Knowledge of Latin is not required. Selections from Horace, Persius, Petronius, Seneca, Martial, and Juvenal. W

211. **Mythology of Greece and Rome.** 4 hours. Myth and religion, history, folk tales, and literature. Open to sophomores with permission of the department. W, S, F

215. **The Intellectual Development of Greece.** 4 hours. Knowledge of Greek is not required. Selections from the philosophers, poets, historians, and scientists. Prerequisite: Junior standing.

249. **Greek Tragic Drama in Translation.** 4 hours. Same as Engl. 249. Knowledge of Greek is not required. The plays of Aeschylus, Sophocles, Euripides. Prerequisite: Junior standing, or consent of the instructor. Su, F

DANCE

100. Creative Dance. 1 hour. Exploration of movement; rhythmic analysis; dance composition.

200. Teaching of Dance and Gymnastics. 4 hours. Lecture discussion course designed to present foundations of learning rhythmic and gymnastic activities; teaching techniques; evaluation procedures; resources and teaching aids. Prerequisites: PEW 151 and Dance 100.

235. Folk, Square, and Ballroom Dance. 3 hours. Skills and techniques, rhythmic analysis, word cues, cultural history, and literature and music sources of folk, square, and ballroom dances.

DESIGN

201. Colloquium. 1 hour. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Completion of the foundation program.

202. Communications Design. 2 hours. Theory and application of the elements of communications design through experiments with image, letter, form, and illustration. Prerequisite: Completion of the foundation program.

203. Communications Design. 3 hours. Inventive exploration of applications of illustrative techniques combining word and image, collage, and imprinting. Prerequisite: Completion of the foundation program.

204. Communications Design. 4 hours. Free and controlled manipulation of symbol, type, drawing, and photoimage from the two-dimensional plane to volume. Prerequisite: Completion of the foundation program.

205. Communications Design. 5 hours. A comprehensive investigation of the elements and interrelations of communications design, demonstrated by research and analysis. Prerequisite: Completion of the foundation program.

206. Typographic design. 2 hours. Theory and application of the elements of typography. Prerequisite: Completion of the foundation program.

207. Typographic Design. 3 hours. Visual communications projects based on the use of typographic elements and the study of basic printing methods. Prerequisite: Completion of the foundation program.

208. Typographic Design. 4 hours. Typographic projects, utilizing various printing processes. Prerequisite: Completion of the foundation program.

209. Typographic Design. 5 hours. Comprehensive projects involving type selection, representation, and organization preliminary to comprehensive presentation. Anal-

ysis of materials and production methods. Prerequisite: Completion of the foundation program.

210. **Colloquium. 1 hour.** Continues Des. 201. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 201.

211. **Communications Design. 2 hours.** Continues Des. 202. Theory and application of the elements of communications design through experiments with image, letter, form, and illustration. Prerequisite: Any one of Des. 202 through 209.

212. **Communications Design. 3 hours.** Continues Des. 203. Inventive exploration of applications of illustrative techniques combining word and image, collage, and imprinting. Prerequisite: Any one of Des. 202 through 209.

213. **Communications Design. 4 hours.** Continues Des. 204. Free and controlled manipulation of symbol, type, drawing, and photoimage from the two-dimensional plane to volume. Prerequisite: Any one of Des. 202 through 209.

214. **Communications Design. 5 hours.** Continues Des. 205. A comprehensive investigation of the elements and interrelations of communications design, demonstrated by research and analysis. Prerequisite: Any one of Des. 202 through 209.

215. **Typographic Design. 2 hours.** Continues Des. 206. Theory and application of the elements of typography. Prerequisite: Any one of Des. 202 through 209.

216. **Typographic Design. 3 hours.** Continues Des. 207. Visual communications projects based on the use of typographic elements and the study of basic printing methods. Prerequisite: Any one of Des. 202 through 209.

217. **Typographic Design. 4 hours.** Continues Des. 208. Typographic projects, utilizing various printing processes. Prerequisite: Any one of Des. 202 through 209.

218. **Typographic Design. 5 hours.** Continues Des. 209. Comprehensive projects involving type selection, representation, and organization preliminary to comprehensive presentation. Analysis of materials and production methods. Prerequisite: Any one of Des. 202 through 209.

219. **Colloquium. 1 hour.** Continues Des. 210. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 210.

220. **Communications Design. 2 hours.** Continues Des. 211. Theory and application of the elements of communications design through experiments with image, letter, form, and illustration. Prerequisite: Any one of Des. 211 through 218.

221. **Communications Design. 3 hours.** Continues Des. 212. Inventive exploration of applications of illustrative techniques combining word and image, collage, and imprinting. Prerequisite: Any one of Des. 211 through 218.

222. Communications Design. 4 hours. Continues Des. 213. Free and controlled manipulation of symbol, type, drawing, and photoimage from the two-dimensional plane to volume. Prerequisite: Any one of Des. 211 through 218.

223. Communications Design. 5 hours. Continues Des. 214. A comprehensive investigation of the elements and interrelations of communications design, demonstrated by research and analysis. Prerequisite: Any one of Des. 211 through 218.

224. Typographic Design. 2 hours. Continues Des. 215. Theory and application of the elements of typography. Prerequisite: Any one of Des. 211 through 218.

225. Typographic Design. 3 hours. Continues Des. 216. Visual communications projects based on use of typographic elements and the study of basic printing methods. Prerequisite: Any one of Des. 211 through 218.

226. Typographic Design. 4 hours. Continues Des. 217. Typographic projects, utilizing various printing processes. Prerequisite: Any one of Des. 211 through 218.

227. Typographic Design. 5 hours. Continues Des. 218. Comprehensive projects involving type selection, representation, and organization preliminary to comprehensive presentation. Analysis of materials and production methods. Prerequisite: Any one of Des. 211 through 218.

228. Colloquium. 1 hour. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing and evaluating projects in courses in the student's major field. Prerequisite: Des. 219.

229. Communications Design. 2 hours. Inventive exploration of illustrative techniques combining word and image in communications design. Studies in application. Prerequisite: Any one of Des. 220 through 227.

231. Communications Design. 4 hours. Development of a significant comprehensive theme applicable to the problems of display, exhibition, stage, museum, exposition, and other areas. Research, planning, and scale-model making. Prerequisite: Any one of Des. 220 through 227.

233. Colloquium. 1 hour. Continues Des. 228. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 228.

234. Communications Design. 2 hours. Continues Des. 229. Inventive exploration of illustrative techniques combining word and image in communications design. Studies in application. Prerequisite: Any one of Des. 229, 231, 330, 332.

235. Communications Design. 3 hours. An intensive project: Long-range planning, development, coordination. Analysis and research; presentation technique. Prerequisite: Any one of Des. 229, 231, 330, 332.

238. Colloquium. 1 hour. Continues Des. 233. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 233.

239. Communications Design. 2 hours. Continues Des. 234. Inventive exploration of illustrative techniques combining word and image in communications design. Studies in application. Prerequisite: Any one of Des. 234, 235, 336, 337.

240. Communications Design. 3 hours. Continues Des. 235. An intensive project: Long-range planning, development, coordination; analysis and research; presentation technique. Prerequisite: Any one of Des. 234, 235, 336, 337.

243. Colloquium. 1 hour. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Completion of the foundation program.

244. Photography-Film. 2 hours. Basic principles of photography or cinematography with introduction to camera, light meter, and printing techniques. Prerequisite: Completion of the foundation program.

245. Photography-Film. 3 hours. The camera as a means of recording. Interpreting complex volumes and situations. Projection by enlarging. Incorporation of other materials on photosensitive surfaces. Prerequisite: Completion of the foundation program.

246. Photography-Film. 4 hours. Light-design problems where objects and images are interrelated through darkroom techniques. Studies of multiple exposure, distortion, and color. Prerequisite: Completion of the foundation program.

247. Photography-Film. 5 hours. Photography or cinematography. A comprehensive experimental use of light as a creative and expressive medium, exploration of single and multiple projection through slides or motion pictures on flat, volumetric, or spatial surfaces, static or in motion. Prerequisite: Completion of the foundation program.

248. Colloquium. 1 hour. Continues Des. 243. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 243.

249. Photography-Film. 2 hours. Continues Des. 244. Further application of principles of photography or cinematography using camera, light meter, and printing techniques. Prerequisite: Any one of Des. 244, 245, 246, 247.

250. Photography-Film. 3 hours. Continues Des. 245. The camera as a means of recording. Interpreting complex volumes and situations. Projection by enlarging. Incorporation of other materials on photosensitive surfaces. Prerequisite: Any one of Des. 244, 245, 246, 247.

251. Photography-Film. 4 hours. Continues Des. 246. Light-design problems where objects and images are interrelated through darkroom techniques. Studies of multiple exposure, distortion, and color. Prerequisite: Any one of Des. 244, 245, 246, 247.

252. Photography-Film. 5 hours. Continues Des. 247. Photography or cinematography. A comprehensive experimental use of light as a creative and expressive me-

dium, exploration of single and multiple projection through slides or motion pictures on flat, volumetric, or spatial surfaces, static or in motion. Prerequisite: Any one of Des. 244, 245, 246, 247.

253. Colloquium. 1 hour. Continues Des. 248. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 248.

254. Photography-Film. 2 hours. Continues Des. 249. Further application of principles of photography or cinematography using camera, light-meter, and printing techniques. Prerequisite: Any one of Des. 249, 250, 251, 252.

255. Photography-Film. 3 hours. Continues Des. 250. The camera as a means of recording. Interpreting complex volumes and situations. Projection by enlarging. Incorporation of other materials on photosensitive surfaces. Prerequisite: Any one of Des. 249, 250, 251, 252.

256. Photography-Film. 4 hours. Continues Des. 251. Light-design problems where objects and images are interrelated through darkroom techniques. Studies of multiple exposure, distortion, and color. Prerequisite: Any one of Des. 249, 250, 251, 252.

257. Photography-Film. 5 hours. Continues Des. 252. Photography or cinematography. A comprehensive experimental use of light as a creative and expressive medium, exploration of single and multiple projection through slides or motion pictures on flat, volumetric, or spatial surfaces, static or in motion. Prerequisite: Any one of Des. 249, 250, 251, 252.

258. Colloquium. 1 hour. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 253.

259. Photography-Film. 2 hours. An introduction to photography or cinematography with experiments in various film-making and recording techniques. Prerequisite: Any one of Des. 254, 255, 256, 257.

263. Colloquium. 1 hour. Continues Des. 258. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 258.

264. Photography-Film. 2 hours. Continues Des. 259. An introduction to photography or cinematography with experiments in various film-making and recording techniques. Prerequisite: Any one of Des. 259, 360, 361, 362.

265. Photography-Film. 3 hours. Experimentation directed toward preparation for projects in photography or cinematography, audiovisual aids, television, and theatre. Prerequisite: Any one of Des. 259, 360, 361, 362.

268. Colloquium. 1 hour. Continues Des. 263. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 263.

269. Photography-Film. 2 hours. Continues Des. 264. An introduction to photography or cinematography with experiments in various film-making and recording techniques. Prerequisite: Any one of Des. 264, 265, 366, 367.

270. Photography-Film. 3 hours. Continues Des. 265. Experimentation directed toward preparation for projects in photography or cinematography, audiovisual aids, television, and theatre. Prerequisite: Any one of Des. 264, 265, 366, 367.

271. Colloquium. 1 hour. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Completion of the foundation program.

272. Industrial Design. 2 hours. An experimental approach to the utilization of functional structures, i.e., for support and suspension in tension and compression. Application of the foregoing principles to functional design. Prerequisite: Completion of the foundation program.

273. Industrial Design. 3 hours. Studies of two-dimensional and three-dimensional presentations, sequential analysis, photo recording, charts, diagrams, drawings, and other visual materials. Prerequisite: Completion of the foundation program.

274. Industrial Design. 4 hours. Systematic two-dimensional and three-dimensional investigation of communication elements as they relate to design and planning for display and exhibition design. Prerequisite: Completion of the foundation program.

275. Industrial Design. 5 hours. Analysis and planning preliminary to comprehensive projects involving the development of solutions to problems of production, logistics, and the like. Prerequisite: Completion of the foundation program.

276. Colloquium. 1 hour. Continues Des. 271. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 271.

277. Industrial Design. 2 hours. Continues Des. 272. An experimental approach to the utilization of functional structures, i.e., for support and suspension in tension and compression. Application of above principles to functional design. Prerequisite: Any one of Des. 272, 273, 274, 275.

278. Industrial Design. 3 hours. Continues Des. 273. Prototyping, production processes, material investigation. Prerequisite: Any one of Des. 272, 273, 274, 275.

279. Industrial Design. 4 hours. Continues Des. 274. Systematic two-dimensional and three-dimensional investigation of communication elements as they relate to design and planning for display and exhibition design. Prerequisite: Any one of Des. 272, 273, 274, 275.

280. Industrial Design. 5 hours. Continues Des. 275. Analysis and planning prelimi-

nary to comprehensive projects involving the development of solutions to problems of production, logistics, and the like. Prerequisite: Any one of Des. 272, 273, 274, 275.

281. Colloquium. 1 hour. Continues Des. 276. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 276.

282. Industrial Design. 2 hours. Continues Des. 277. An experimental approach to the utilization of functional structures, i.e., for support and suspension in tension and compression. Application of above principles to functional design. Prerequisite: Any one of Des. 277, 278, 279, 280.

283. Industrial Design. 3 hours. Continues Des. 278. Prototyping, production processes, material investigation. Prerequisite: Any one of Des. 277, 278, 279, 280.

284. Industrial Design. 4 hours. Continues Des. 279. Systematic two-dimensional and three-dimensional investigation of communication elements as they relate to design and planning for display and exhibition design. Prerequisite: Any one of Des. 277, 278, 279, 280.

285. Industrial Design. 5 hours. Continues Des. 280. Analysis and planning preliminary to comprehensive projects involving the development of solutions to problems of production, logistics, and the like. Prerequisite: Any one of Des. 277, 278, 279, 280.

286. Colloquium. 1 hour. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 281.

287. Industrial Design. 2 hours. Advanced design in two-dimensional and three-dimensional presentations, sequential analysis, photo records, charts, diagrams, drawings, and other visual materials. Prerequisite: Any one of Des. 282, 283, 284, 285.

290. Colloquium. 1 hour. Continues Des. 286. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 286.

291. Industrial Design. 2 hours. Continues Des. 287. Advanced design in two-dimensional and three-dimensional presentation, sequential analysis, photo records, charts, diagrams, and other visual materials. Prerequisite: Des. 287.

292. Industrial Design. 3 hours. Projects developed from forming concepts. Natural and synthetic materials; heat, chemical, and mechanical processes. Prototyping techniques and material investigation. Prerequisite: Des. 287.

295. Colloquium. 1 hour. Continues Des. 290. Current problems in design presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Des. 290.

296. **Industrial Design. 2 hours.** Continues Des. 291. Advanced design in two-dimensional and three-dimensional presentation, sequential analysis, photo records, charts, diagrams, drawings, and other visual materials. Prerequisite: Des. 291 or 292.

297. **Industrial Design. 3 hours.** Continues Des. 292. Projects developed from forming concepts. Natural and synthetic materials; heat, chemical, and mechanical processes. Prototyping techniques and material investigation. Prerequisite: Des. 291 or 292.

330. **Synthesis of the Plastic Arts and Design. 3 hours.** Interrelation of the plastic and graphic arts through experiences with two-dimensional and three-dimensional projects. Prerequisite: Any one of Des. 220 through 227.

332. **Communications Design. 5 hours.** A comprehensive project in an area of social significance, using several mass media. Research, analysis, development, design, coordination, and presentation. Prerequisite: Any one of Des. 220 through 227.

336. **Communications Design. 4 hours.** Continues Des. 231. A significant comprehensive theme applicable to the problems of display, exhibition, stage, museum, exposition, and other areas. Research, planning, and scale-model making. Prerequisite: Any one of Des. 229, 231, 330, 332.

337. **Communications Design. 5 hours.** Continues Des. 332. A comprehensive project in an area of social significance, using several mass media. Research, analysis, development, design, coordination, and presentation. Prerequisite: Any one of Des. 229, 231, 330, 332.

341. **Communications Design. 4 hours.** Continues Des. 336. A significant comprehensive theme applicable to the problems of display, exhibition, stage, museum, exposition, and other areas. Research, planning, and scale-model making. Prerequisite: Any one of Des. 234, 235, 336, 337.

342. **Communications Design. 5 hours.** Continues Des. 337. A comprehensive project in an area of social significance, using several mass media. Research, analysis, development, design, coordination, and presentation. Prerequisite: Any one of Des. 234, 235, 336, 337.

360. **Synthesis of the Plastic Arts and Design. 3 hours.** Interrelation of the plastic and graphic arts through experiences with two-dimensional and three-dimensional projects. Prerequisite: Any one of Des. 254, 255, 256, 257.

361. **Photography-Film. 4 hours.** Elements of photographic communication with lights and multiple projection, using slides, film strips, gelatins, filters, words, and images. Prerequisite: Any one of Des. 254, 255, 256, 257.

362. **Photography-Film. 5 hours.** A significant project in photographic or cinemagraphic communication involving photo animation, photo journalism, portraiture, and editorial, industrial, or architectural photography. Prerequisite: Any one of 254, 255, 256, 257.

366. **Photography-Film. 4 hours.** Continues Des. 361. Elements of photographic communication with lights and multiple projection, using slides, film strips, gelatins, filters, words, and images. Prerequisite: Any one of Des. 259, 360, 361, 362.

367. **Photography-Film. 5 hours.** Continues Des. 362. A significant project in photographic or cinemagraphic communication, involving photo animation, photo journalism, portraiture, and editorial, industrial, or architectural photography. Prerequisite: Any one of Des. 259, 360, 361, 362.

371. **Photography-Film. 4 hours.** Continues Des. 366. Elements of photographic communication, with lights and multiple projection, using slides, film strips, gelatins, filters, words, and images. Prerequisite: Any one of Des. 264, 265, 366, 367.

372. **Photography-Film. 5 hours.** Continues Des. 367. A significant project in photographic or cinemagraphic communication involving photo animation, photo journalism, portraiture, and editorial, industrial, or architectural photography. Prerequisite: Any one of Des. 264, 265, 366, 367.

388. **Synthesis of the Plastic Arts and Design. 3 hours.** Interrelation of the plastic and graphic arts through experiences with two-dimensional and three-dimensional projects. Prerequisite: Any one of Des. 282, 283, 284, 285.

389. **Industrial Design. 4 hours.** Comprehensive development of systems for mass forming of materials for general and specific goals; economics of production and distribution. Prerequisite: Any one of Des. 282, 283, 284, 285.

390. **Industrial Design. 5 hours.** An advanced comprehensive design, research, and development project involving areas of human environmental requirements. Research, analysis, planning, prototypes, testing, and total presentation. Prerequisite: Any one of Des. 282, 283, 284, 285.

393. **Industrial Design. 4 hours.** Continues Des. 389. Comprehensive development of systems for mass forming of materials for general and specific goals; economics of production and distribution. Prerequisite: Any one of Des. 287, 388, 389, 390.

394. **Industrial Design. 5 hours.** Continues Des. 390. An advanced comprehensive design, research, and development project involving areas of human environmental requirements. Research, analysis, planning, prototypes, testing, and total presentation. Prerequisite: Any one of Des. 287, 388, 389, 390.

398. **Industrial Design. 4 hours.** Continues Des. 393. Comprehensive development of systems for mass forming of materials for general and specific goals; economics of production and distribution. Prerequisite: Any one of Des. 291, 292, 393, 394.

399. **Industrial Design. 5 hours.** Continues Des. 394. An advanced comprehensive design, research, and development project involving areas of human environmental requirements. Research, analysis, planning, prototypes, testing, and total presentation. Prerequisite: Any one of Des. 291, 292, 393, 394.

ECONOMICS

120. Principles of Economics I. 4 hours. The elements of economic analysis: concepts of economy, market organization, price determination and function. Prerequisite: Sophomore standing.

121. Principles of Economics II. 4 hours. The elements of economic analysis, continued: determination of the level of economic activity; the effect of monetary and fiscal policies on economic activity levels. Applications to economic policy. Prerequisite: Econ. 120.

320. Macroeconomic Theory. 4 hours. Principles of national income accounting, determination of aggregate income and employment, the monetary system in relation to income and employment, short-term income fluctuations, long-term income growth. Prerequisite: Econ. 121 and Fin. 340.

321. Microeconomic Theory. 4 hours. The operation of individual markets; market structure; the theory of the firm; the theory of production; demand theory; general equilibrium and welfare economics. Prerequisite: Econ. 121.

322. Managerial Economics. 4 hours. The application of economic theory to decision making in the business firm. Demand and cost analysis (including demand forecasts); price policy of the individual firm; capital budgeting; production analysis; uses of operations research methods. Prerequisite: Econ. 321.

323. Business Conditions Analysis. 4 hours. The application of economic theory to analysis of changes in aggregate income and employment; methods of forecasting changes. Examination of economic models and other analytical tools; their uses in the prediction of aggregate and more refined levels of business activity. Prerequisite: Econ. 320.

324. Economic History of the United States. 4 hours. The growth of the American economy from colonial times to the present; special emphasis on the forces and factors contributing to this process. Prerequisite: Econ. 121.

325. Economic History of Europe. 4 hours. Evolution of the economic institutions of Europe, beginning with the origins of capitalism; the development of industry, commerce, transportation, finance, and labor. Prerequisite: Econ. 121.

326. History of Economic Thought. 4 hours. Survey of the major schools of economic thought; analysis of the historical evolution of the leading ideas of modern economics. Prerequisite: Econ. 121.

327. Comparative Economic Systems. 4 hours. Description and analysis of the normative and positive characteristics of capitalsim, fascism, democratic socialism, and communism. Prerequisite: Econ. 121.

328. Government Finance. 4 hours. Government finance at the federal, state, and local levels, including government expenditures, principles of taxation, fiscal policy, government borrowing and the national debt, and intergovernmental fiscal relations. Prerequisite: Econ. 121.

329. Industrial Organization. 4 hours. The structure of markets; behavior of firms within the market environment; measures of industrial concentration; economics of scale; mergers and the merger movement; price discrimination and tie-in sales; monopoly and cartel arrangements; resale price maintenance; innovation and technological change. Prerequisite: Econ. 121.

330. Government and Business. 4 hours. The rationale and the mechanisms of the social control of business; the effects of government action in influencing the behavior of business firms; the pro-competitive policy embodied in the Sherman Act and related legislation. Prerequisite: Econ. 121.

331. Labor Economics. 4 hours. Economic problems and issues of trade union organization and wage theory; job security, hours, working conditions, labor legislation, unemployment. Prerequisite: Econ. 121.

332. Urban Economics. 4 hours. Survey of economic problems of cities; the nature and function of cities; the demand for, and supply of housing and urban land; implications of location theory for the spatial pattern of cities; the impact of government programs. Prerequisite: Econ. 121.

333. International Economics. 4 hours. The balance of payments; fixed, flexible, and multiple exchange rates; the forward exchange market; the international trade multiplier; the transfer problem; capital flows; the law of comparative advantage; the gains from trade, tariffs and subsidies; the factor price equalization theorem; international economic communities. Prerequisite: Econ. 121.

334. Economic Development. 4 hours. Basic problems and characteristics of underdeveloped countries; Classical, neo-Classical, and modern contributions to the theory of development; major proposals for accelerating development; basic approaches to economic development; *laissez-faire*, interventionist; role and methods of planning; foreign aid; and economic integration. Prerequisite: Econ. 121.

335. Econometrics. 4 hours. Formulation and testing of stochastic models; special emphasis on economic models, both static and dynamic. Problems of estimation and a number of applications, such as business forecasting, are considered. Prerequisites: QM 170, 171, and 172, Econ. 320 and 321, Math. 111 and 112, or consent of the instructor.

398. Independent Study in Economics. 2 to 5 hours. May be repeated once for credit. Independent study under the direction of a faculty member. Prerequisites: 15 hours of 300-level courses in economics and permission of the head of the department.

399. Special Topics in Economics. 4 hours. May be repeated once for credit. Intensive consideration of a limited number of problems in a particular field of economics, using more advanced techniques of analysis. Use of professional literature is an important part of the course. Prerequisites: Econ. 320 and/or 321; an introductory field course, if applicable; and consent of the instructor.

EDUCATION*

170. Educational Foundations. 4 hours. The philosophical, historical, and social forces influencing current issues and practices in American education; their relevance in understanding the role of the teacher. Prerequisites: Psch. 100 and 60 hours of work.

210. The Educative Process. 4 hours. An interdisciplinary study of the biosocial and psychological factors influencing learning processes; the application of behavioral sciences knowledge to understanding the individual learner in the educative process. Prerequisites: Ed. 170 or the equivalent.

221. Children's Literature. 4 hours. A survey of children's literature from the seventeenth century to the present. Emphasis on the classics and present day literature; methods of selection; using literature with children.

230. Curriculum and Instruction in the Secondary School. 4 hours. Basic principles of curriculum development, organization of learning experiences, the basic concepts of teaching. The application of the principles prepares the student for responsibilities in curriculum planning and classroom instruction in his fields of specialization. Prerequisites: Ed. 210.

235. Curriculum and Instruction in the Elementary School. 4 hours. Active investigation of the general dynamics of curriculum development at the elementary school level; special emphasis on research and synthesis in developing and coordinating the classroom experience. Prerequisites: Ed. 170 and 210.

250. Educational Evaluation. 4 hours. Theories and methods of evaluation: the assessment of individuals, groups, and educational institutions in the attainment of educational objectives. Prerequisites: Ed. 230.

270. Educational Practice with Seminar. 12 hours. The professional quarter of practice teaching, including a weekly seminar, to meet certification requirements for teaching in the secondary school. Prerequisites: Ed. 250, admission to advanced standing, and recommendation of the department of specialization.

*Classroom observation and/or related field experiences in the public schools are required of all students enrolled in each education course.

ENERGY ENGINEERING

201. Thermodynamics. 4 hours. Macroscopic thermodynamics with some treatment of microscopic principles. First and second laws of thermodynamics and their applications to engineering systems of current interest. Equations of state. Prerequisite: Concurrent registration in Math. 132.

202. Intermediate Thermodynamics. 4 hours. Thermodynamics of state. Vapor and gas power cycles; refrigeration cycles. Prerequisite: EnrE. 201.

211. Fluid Mechanics. 4 hours. Fundamental laws governing fluid flow with applications to internal and external flow problems, including the effects of compressibil-

ity and viscosity. Prerequisites: EnrE. 201; credit or registration in Math. 220 or the equivalent.

212. Potential Flow. 4 hours. Basic irrotational flows, their combination and transformation used in modeling flows with solid surfaces. Elementary, two-dimensional airfoil theory. Prerequisites: EnrE. 211; Math. 220 or the equivalent.

213. Compressible Flow. 4 hours. Compressible, isentropic, one-dimensional flow. Waves and characteristics in supersonic flows. Prerequisite: EnrE. 211; Math. 220 or the equivalent.

214. Viscous Fluid Mechanics. 4 hours. Governing equations, energy dissipation, exact and approximate solutions, boundary layer theory, turbulent flows. Prerequisites: EnrE. 211; Math. 220 or the equivalent.

215. Engineering Hydrology. 4 hours. Basic principles, methods of analysis, and applications for engineering planning and design. Major topics include the various phases of the hydrologic cycle, data collection and interpretation, water resources systems, determination of flow capacity for hydraulic structures. Statistical analysis. Prerequisite: EnrE. 211.

216. Oceanography. 4 hours. A study of the marine environment, both chemical and physical. Waves, currents, and mixing processes. Marine organisms. Prerequisites: EnrE. 211 and 214.

217. Introduction to Meteorology. 4 hours. An examination of the factors which control our climatic environment. Study of the atmosphere at rest and in motion. Wind structure and atmospheric turbulence. Aspects of heat transfer, diffusion, and evaporation as related to meteorlogical phenomena. Study of the overall system. Prerequisites: EnrE. 212 and 214.

221. Heat Transfer. 4 hours. Elementary treatment of the fundamental laws governing engineering heat transfer: conduction, convection, and radiation, with emphasis to be placed on physical understanding rather than empiricism; elementary application of the principles. Prerequisite: EnrE. 211.

231. Chemical Reaction Thermodynamics I. 4 hours. Review of first and second laws of thermodynamics with subsequent applications to chemical systems. Free energy, availability, equilibrium conditions, and applications to chemical processes. Equilibrium constant and chemical potential for ideal gas reactions and heterogeneous systems. Phase change. Prerequisites: EnrE. 201, Chem. 195, and Math. 133.

232. Chemical Process Analysis. 3 hours. Material and energy balances applied to chemical systems. Thermo-chemical calculations of heats of reaction and combustion. Vapor pressure, solubility, and partial pressure. Calculations of chemical and metallurgical process systems. Prerequisite: EnrE. 231 and Math. 195.

281. Design. 2 to 5 hours. May be repeated for credit. The design approach involving modeling, analysis, and synthesis of basic fundamentals in engineering problems. Prerequisite: EnrE. 213 or 215.

282. **Design.** 4 hours. The design approach to engineering projects requiring team work. Prerequisite: EnrE. 281.

304. **Elementary Transport Phenomena.** 4 hours. Introductory kinetic theory of gases, transport properties, theory of real gases, simple kinetic theory of liquids. Prerequisites: EnrE. 201 and 211; Math. 220 or the equivalent.

305. **Statistical Thermodynamics.** 4 hours. Statistical formulation; partition functions, including quantum effect. Application to macroscopic systems; systems of interacting particles. Emphasis on engineering applications. Prerequisites: EnrE. 201; Math. 220 or the equivalent.

310. **Continuum Fluid Mechanics.** 4 hours. Development of the conservation equations for a Newtonian fluid: continuity, Navier-Stokes, and energy equations. Some exact and approximate solutions of highly viscous, viscous, and inviscid flow problems. Prerequisite: Math. 220.

311. **Free Surface Flow.** 4 hours. Application of the fundamentals of fluid mechanics to fluids with a free surface. Wave phenomena, channel flow, and free streamlines. Prerequisites: EnrE. 212 and 214.

312. **Porous Media.** 4 hours. Mechanics of fluid flow in porous media. Steady and unsteady flow in isotropic and anisotropic media. Multiphase and multilayered systems. Prerequisites: EnrE. 212 and 215.

313. **Aerodynamics of Flight.** 4 hours. Lift and drag, both subsonic and supersonic. Perturbation problems. Air-foil and slender body theories. Three-dimensional wings. Prerequisites: EnrE. 212, 213, and 214.

314. **Propulsion.** 4 hours. Thermodynamics and fluid mechanics of air breathing engines. Performance of rockets: chemical, nuclear, and electrical. Prerequisites: EnrE. 202 and 213.

321. **Intermediate Heat Transfer.** 4 hours. Topics in conduction, convection, and radiation heat transfer, with special emphasis on the exact solutions of the problems. Two-phase flow: heat exchangers; mass transfer cooling; rarefied gas analysis. Prerequisite: EnrE. 221.

331. **Chemical Reaction Thermodynamics II.** 3 hours. Clausius-Clapeyron equation for a pure component. Development and application of phase rule to one component vapor-liquid-solid system. Extension to multicomponent systems. Consideration of retrograde condensation, azeotropic mixtures, critical properties of pure systems. Third law of thermodynamics and applications. Fugacity and activity of solutions and gases. Prerequisite: EnrE. 231.

351. **Electromechanical Energy Conversion I.** 4 hours. Conservation of energy, electromagnetic forces, applications to linear and nonlinear lumped-parameter systems, stability. Principles of rotating machines and equations of motion. Applications to synchronous, induction, d-c, and novel machines. Prerequisites: InfE. 221 and credit or registration in InfE. 311 or consent of the instructor.

352. Electromechanical Energy Conversion II. 4 hours. Continues EnrE. 351. Completion of rotating machines. Interaction of electromagnetic fields with stationary and moving continuous media. Maxwell stress tensor and waves and instabilities. Applications to energy conversion with emphasis on fluid (magnetohydrodynamics). Prerequisites: EnrE. 211, 351, and InfE. 320.

353. Direct Energy Conversion. 4 hours. Novel methods of converting heat directly to electrical energy. Consideration of magnetohydrodynamics, thermoelectrics, thermionics, and fuel cells. Prerequisites: EnrE. 202 and 352 or consent of the instructor.

356. Introduction to Plasmas. 4 hours. Motion of particles in electric and magnetic fields. Kinetic theory and elementary processes. Boltzmann equation, macroscopic equations, transport coefficients. Creation of ionized gas. The magnetohydrodynamic approximation. Waves and instabilities. Prerequisites: InfE. 221 or the equivalent.

385. Chemical Process Design I. 4 hours. Applications of principles of stage-wise methods to heat and mass transfer operations. Studies of types of equipment as illustrated by fixed, continuous flow, and fluidized beds. Computer programming of a typical multicomponent distillation problem. Chemical engineering laboratory. Prerequisites: Math. 195 and Chem. 340.

386. Chemical Process Design II. 4 hours. Principles of rate processes; application to chemical systems. Development of reactor unit concept. Interpretation of reactor data. Product distribution in multiple reactions; selection of rate controlling step. Application to design. Chemical engineering laboratory experiments. Prerequisites: EnrE. 385 and Math. 220.

391. Seminar. 1 to 4 hours. Topics to be arranged. Prerequisites: Senior standing and consent of the instructor.

392. Undergraduate Research. 2 to 4 hours. Research under close supervision of a faculty member. Prerequisites: Senior standing and consent of the instructor.

393. Special Problems. 2 to 4 hours. Special problems or reading by special arrangement with the faculty. Prerequisites: Senior standing and consent of the instructor.

ENGLISH

101. Introduction to Poetry. 4 hours. Understanding poetry by reading and discussing representative poems. W, S, Su, F

102. Introduction to Drama. 4 hours. Understanding drama by reading and discussing representative plays. Selections from Greek, Elizabethan, modern English, Continental, and American drama. W, S, Su, F

103. Introduction to Fiction. 4 hours. Understanding fiction by reading and discussing representative American, British, and Continental fiction of several periods and types. W, S, Su, F

111. Introduction to Library Science for Teachers of High School English. 4 hours. Examination of the principles of library organization, book selection and research and bibliography for grades seven through twelve. Individual conferences on assigned papers are required. W, S, F

131. Introduction to Shakespeare. 4 hours. Introductory survey of Shakespeare's plays and poems. Prerequisite: Sophomore standing or exemption from Rhet. 102. F

150. A Survey of English Literature I. 4 hours. Credit is not given for Engl. 150 if the student has credit in 121. Note: Engl. 150, 151, and 152 are required of all English majors. A chronological survey of the major works of English literature from about 760 to 1660. Prerequisite: Sophomore standing or exemption from Rhet. 102 or James Scholar status. W, S, Su, F

151. A Survey of English Literature II. 4 hours. Credit is not given for Engl. 151 if the student has credit in 122. A chronological survey of the major works of English literature from 1660 to 1832. Prerequisites: Sophomore standing or exemption from Rhet. 102 or James Scholar status and Engl. 150. W, S, Su, F

152. A Survey of English Literature III. 4 hours. Credit is not given for Engl. 152 if the student has credit in 123. A chronological survey of the major works of English literature from 1832 to the present. Prerequisites: Sophomore standing or exemption from Rhet. 102 or James Scholar status and Engl. 151. W, S, Su, F

198. Freshman Honors Seminar. 4 hours. Admission is by invitation after screening by University Honors Office, followed by department's further testing. May be repeated for a maximum of 12 hours. Introduction to literature for selected freshmen. The subject of the seminar is changed every quarter. Students who complete three English 198 seminars may earn exemption from Rhetoric 102. Prerequisites: Freshman standing and admission to the honors program in English. F

Note: 200-level and 300-level courses are restricted to juniors, seniors and to those lower-division students who have the consent of the instructor.

210. The Teaching of English. 4 hours. For prospective teachers of English in secondary schools. Emphasis on theory and practice in the teaching of English. Prerequisite: Senior standing or consent of the instructor. W, S, Su, F

225. English Literature of the Early Renaissance. 4 hours. Sidney, Marlowe, Jonson, Spenser, and others. Prerequisite: Junior standing or consent of the instructor. S, F

226. English Literature of the Late Renaissance and Interregnum. 4 hours. Donne, Herrick, Bacon, Burton, Marvell, Hall, Herbert, Milton, and others. Prerequisite: Junior standing or consent of the instructor. W, Su

228. English Prose of the Early Seventeenth Century from 1603 to 1660. 4 hours. Representative selections of English prose, with emphasis on the works of Bacon, Browne, Donne, Milton. Prerequisite: Junior standing or consent of the instructor. W

231. Shakespeare. 4 hours. The young playwright's uses of older and current modes of drama, from Roman comedy and the history play through revenge tragedy. Prerequisite: Junior standing or consent of the instructor. S, F

232. Shakespeare. 4 hours. The mature playwright's handling of great tragic themes and his uses of tragicomedy. Prerequisite: Junior standing or consent of the instructor. W, Su

243. English Prose and Poetry of the Romantic Movement I. 4 hours. Introductory study of the pre-Romantics, with emphasis on Blake and Burns, followed by a close study of the early Romantics, with emphasis on Wordsworth and Coleridge. Prerequisite: Junior standing or consent of the instructor. S, F

244. English Prose and Poetry of the Romantic Movement II. 4 hours. Poetry and fiction of Scott; poetry, criticism, and letters of Byron, Shelley, and Keats; prose of Landor, Hazlitt, Hunt, and De Quincey. Prerequisite: Junior standing or consent of the instructor. W, Su

247. English Literature from 1660 to 1730. 4 hours. Major works of the later decades of the seventeenth century and the early decades of the eighteenth. Restoration drama; Swift, Pope, Addison, Milton, Steele, Fielding, and others. Prerequisite: Junior standing or consent of the instructor. S, F

248. English Literature from 1730 to 1798. 4 hours. The major authors of the middle and late eighteenth century and the intellectual and historical background, with emphasis on the novelists, the Johnson circle and the pre-Romantics. Prerequisite: Junior standing or consent of the instructor. W, Su

249. Greek Tragic Drama in Translation. 4 hours. Same as Cl. 249. Knowledge of Greek is not required. Plays of Aeschylus, Sophocles, Euripides. Prerequisite: Junior standing or consent of the instructor. F

250. The Eighteenth Century Novel. 4 hours. Brief survey of antecedents; discussion of the major novelists (Defoe, Richardson, Fielding, Smollett, and Sterne) and of the development of new forms and kinds, including the novel of sensibility, the novel of manners, the Gothic novel or tale of terror, and other subtypes. Prerequisite: Junior standing or consent of the instructor. W

254. The Bible as Literature. 4 hours. Same as Hum. 254. Literary materials, origins, forms, and interpretations of principal portions of the Old and the New Testaments in English translation. Prerequisite: Junior standing or consent of the instructor. W, S, F

255. Survey of American Literature I. 4 hours. Credit is not given for Engl. 255 if the student has credit in 113. From 1607 to the Civil War. American literature and its cultural background from the beginnings through Poe. Prerequisite: Junior standing or consent of the instructor. W, S, Su, F

256. **Survey of American Literature II. 4 hours.** Credit is not given for Engl. 256 if the student has credit in 114. American literature and its cultural background from the Transcendentalists to 1912. Prerequisites: Junior standing or consent of the instructor and Engl. 255. W, S, Su, F

257. **Survey of American Literature III. 4 hours.** Credit is not given for Engl. 257 if the student has credit in 114. Major figures in American literature from 1912 to the present. Prerequisites: Junior standing or consent of the instructor and Engl. 256. W, S, Su, F

259. **The Victorian Novel. 4 hours.** A critical study of selected novels of the Victorian era, including works by Dickens, Thackeray, Trollope, George Eliot, Meredith, Hardy, and others. Prerequisite: Junior standing or consent of the instructor. W, S, F

263. **Early Victorian Literature. 4 hours.** The major figures of the Victorian Period to 1859: Tennyson, Browning, Arnold, Carlyle, J. S. Mill, Macaulay, Dickens, Thackeray, and others. Prerequisite: Junior standing or consent of the instructor. S

264. **Victorian Literature from 1859 to 1901. 4 hours.** Major figures: FitzGerald, Darwin, Huxley, Newman, Arnold, Ruskin, Hardy, the Rossettis, Meredith, Stevenson, George Eliot, and others. Prerequisite: Junior standing or consent of the instructor. W, Su

281. **Modern Drama I. 4 hours.** The major playwrights and the trends in drama from 1870 to about 1920; particular attention to Ibsen, Strindberg, Shaw, Chekhov. Prerequisite: Junior standing or consent of the instructor. W, F

282. **Modern Drama II. 4 hours.** Major trends and dramatists from the 1920's to the present, including Pirandello, Brecht, O'Neill, Lorca, O'Casey, Giraudoux, Beckett, and others. Prerequisite: Junior standing or consent of the instructor. W, S

283. **English Literature in the Twentieth Century I. 4 hours.** English literature from the 1890's to about 1930. Prerequisite: Junior standing or consent of the instructor. S, F

284. **English Literature in the Twentieth Century II. 4 hours.** English literature from about 1930 to the present. Prerequisite: Junior standing or consent of the instructor. W, Su

285. **Modern Irish Literature—Fiction. 4 hours.** Major writers from the period of the Irish Literary Revival to the present (1880-1960): James Joyce, George Moore, James Stephens, Frank O'Connor, Samuel Beckett, and others. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. F

286. **Modern Irish Literature—Drama and Poetry. 4 hours.** Major playwrights and poets from the Irish Literary Revival to the present (1880-1960): W. B. Yeats, George Russell (AE), J. M. Synge, Lady Gregory, James Stephens, Sean

O'Casey, Samuel Beckett, Hustin Clarke, and others. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

288. **The Twentieth Century American Novel. 4 hours.** Historical and critical study of the development of the American novel from Dreiser to the present. Close reading of several representative novels. Prerequisite: Junior standing or consent of the instructor. W, S, Su, F

289. **Development of Modern Poetry. 4 hours.** Hardy, Yeats, Auden, Dylan Thomas, Frost, Stevens, Eliot, Cummings, and others. Prerequisites: Junior standing and 8 hours of English literature or consent of the instructor. S, F

298. **Senior Honors Seminar. 4 hours.** May be repeated for a maximum of 12 hours. Close study of the works of a particular author or group of authors, of a literary movement or idea, or similar material. The subject of the seminar is changed each quarter. Prerequisites: Senior standing and admission to the honors program in English. W, S, F

299. **Senior Tutorial Seminar. 4 hours.** Admission to this course is only on advice of and initiated by the English department. Individual studies under the direction of an assigned faculty member. Nature of the work is determined by the tutor on the basis of the student's particular needs and interests. Open only to English majors. Prerequisite: Senior standing. W, S, Su, F

301. **Introduction to the English Language. 4 hours.** English as a language. The basic concepts of general descriptive and comparative linguistics are used to examine the relationship of English to other languages, its history, and its present structure. Prerequisite: Junior standing or consent of the instructor. W, S, Su, F

302. **Tennyson and Browning. 4 hours.** A close study of the lyric poetry and the dramatic monologues of Tennyson and Browning; briefer examination of Tennyson's Arthurian idylls and of the plays of both. Prerequisite: Junior standing or consent of the instructor. S

303. **Carlyle and Mill. 4 hours.** Major works. Prerequisite: Junior standing or consent of the instructor. S

305. **Newman and Arnold. 4 hours.** The prose of one early and one mid-Victorian writer: their contributions to nineteenth century religious and educational theories. Arnold's literary and social criticism; the rhetoric of both. Brief reference to the poems and letters of each that most closely parallel ideas and moods in their prose. Prerequisite: Junior standing or consent of the instructor. W, F

306. **Dickens and Thackeray. 4 hours.** A close study of the major writings of the two representative Victorian novelists. Prerequisite: Junior standing or consent of the instructor. W, Su

307. **Yeats and Eliot. 4 hours.** A detailed study of the two most influential poets in English of the twentieth century. Study of specific texts; some emphasis on the intellectual and spiritual attitudes represented by each. Prerequisite: Junior standing or consent of the instructor. F

310. **American Puritanism. 4 hours.** Intensive study of the writings of the American Puritans from William Bradford to Jonathan Edwards. Major aspects of Puritan life and thought. Prerequisite: Junior standing or consent of the instructor. S

311. **Chaucer. 4 hours.** Readings in the major works. Prerequisite: Junior standing or consent of the instructor. W, S, F

312. **Introduction to Old English. 4 hours.** The elements of Old English grammar and the reading of graded prose selections. Prerequisite: Junior standing or consent of the instructor. S, F

313. **Old English Poetry and Prose. 4 hours.** Heroic, elegaic, and religious poetry of England to 1200, exclusive of *Beowulf*; representative prose. Prerequisite: Engl. 312. W

314. ***Beowulf*. 4 hours.** A detailed explication of the poem. Prerequisite: Engl. 313. S

315. **Introduction to Descriptive Linguistics. 4 hours.** Introduction to theories of the syntactic, morphological and phonological analysis and description of language. Prerequisite: Junior standing or consent of the instructor. S, Su, F

316. **American Drama. 4 hours.** The major dramatic writings in American literature. Prerequisite: Junior standing or consent of the instructor. W, S, Su, F

317. **The Writing of Poetry. 4 hours.** Limited to 15 students. May be repeated for a maximum of 12 hours. The practice of the writing of poetry, aided by intensive study of examples. Prerequisites: Junior standing and 8 hours of English literature or consent of the instructor. W, S, Su, F

321. **Medieval Literature I. 4 hours.** Selected works in Middle English and Continental medieval writings in English translation. Prerequisite: Junior standing or consent of the instructor. S

322. **Medieval Literature II. 4 hours.** Continues Engl. 321. Prerequisite: Junior standing or consent of the instructor. F

323. **Wordsworth and Coleridge. 4 hours.** A close examination of the major works, both poetry and prose. Prerequisites: Engl. 243 and 244 or consent of the instructor. W

324. **Byron, Shelley, and Keats. 4 hours.** Major figures of the second generation of Romantics. Prerequisite: Junior standing or consent of the instructor. F

331. **The Important Minor Plays and the Poems of Shakespeare. 4 hours.** A study of the important minor plays and of the poems and sonnets. Prerequisite: Engl. 231 or 232 or consent of the instructor. W, F

334. **Literary Criticism, Theory and Practice. 4 hours.** Survey of literary criticism, focusing on major critics from Plato to Arnold. Prerequisite: Junior standing or consent of the instructor. W, S, Su, F

335. **Modern Literary Criticism. 4 hours.** Survey of modern literary criticism, from Matthew Arnold to the present. Prerequisites: Junior standing or consent of the instructor and Engl. 334. **W, S, Su, F**

336. **Renaissance Drama Exclusive of Shakespeare. 4 hours.** Major dramatic works of Shakespeare's contemporaries. Prerequisite: Junior standing or consent of the instructor. **W, S, F**

337. **Exercises in Literary Criticism: Poetry. 4 hours.** Advanced course in practical criticism of poetry in English. Prerequisites: Junior standing and Engl. 335 or the equivalent or consent of the instructor. **W, S, F**

338. **Tragedy. 4 hours.** A formal and theoretic inquiry into tragedy: its origins, evolution, and significance, based on selected masterworks of various periods. Prerequisite: Junior standing or consent of the instructor. **F**

339. **Comedy. 4 hours.** The history and theory of comic drama. Prerequisite: Junior standing or consent of the instructor.

340. **English and American Satire. 4 hours.** Selected writings. Prerequisite: Junior standing or consent of the instructor.

341. **Dryden. 4 hours.** Dryden's poems, plays, and literary criticism: emphasis on the interaction of these genres in Dryden's development. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. **W, F**

342. **The Poetry of Milton. 4 hours.** Origins, forms, and artistic and ethical values; Milton's place in English literary history. Prerequisite: Junior standing or consent of the instructor. **S**

345. **The Metaphysical Poets. 4 hours.** Donne to Crashaw. Class reading and discussion of the poetry of Donne, Herbert, Vaughan, Crashaw. Special emphasis on the poetry of Donne. Prerequisite: Junior standing or consent of the instructor. **W**

347. **Drama of the Restoration and Eighteenth Century. 4 hours.** Major works after the reopening of the public theatres in 1660; development from aristocratic Baroque tragedy and comedy to bourgeois sentimental drama and other forms. Dryden, Etherege, Wycherley, Congreve, Vanbrugh, Farquhar, Steele, Goldsmith, Sheridan, and others. Prerequisite: Junior standing or consent of the instructor. **S, F**

348. **Pope and Swift. 4 hours.** Detailed study of the works of Pope and Swift in light of the intellectual and aesthetic currents of the period. Prerequisite: Junior standing or consent of the instructor. **S**

349. **Dr. Johnson and His Circle. 4 hours.** Johnson, Boswell, Goldsmith, Reynolds, Burke, Gibbon, and Sheridan are read and discussed. The position of Johnson's circle in the social and literary life of the second half of the eighteenth century. Prerequisite: Junior standing or consent of the instructor.

350. The American Transcendentalists. 4 hours. The Transcendentalist circle in and about Concord from 1830 to 1860: Emerson and Thoreau, Alcott, Brownson, Fuller, Ripley, Parker, Channing, and others. Prerequisite: Engl. 255 or Hist. 356 or 357. **F**

355. American Fiction from 1800 to 1860. 4 hours. Intensive study of the background and development of traditions and themes in American fiction from 1800 to 1860. Prerequisites: Junior standing and Engl. 255 or consent of the instructor. **S**

357. Studies in the Short Story. 4 hours. The short story as a literary form, with close readings of selected short stories. Prerequisite: Junior standing or consent of the instructor. **S, Su, F**

364. Readings in the Lyric I: European. 4 hours. Selections from Sappho, Catullus, Petrarch, Villon, San Juan de la Cruz, Goethe, Leopardi, Baudelaire. Students are expected to have a reading knowledge of at least one of the foreign languages involved. Prerequisite: Junior standing or consent of the instructor. **F**

365. Readings in the Lyric II: English. 4 hours. Selected lyrics from the thirteenth through the nineteenth centuries. Prerequisite: Junior standing or consent of the instructor.

366. Readings in the Lyric III: Twentieth Century. 4 hours. Selections from Yeats, Valery, Rilke, Frost, Montale, Garcia Lorca, Auden. Students are expected to have a reading knowledge of at least one of the foreign languages involved. Prerequisite: Junior standing or consent of the instructor.

375. Henry James and the Technique of Fiction. 4 hours. Development of Henry James as a novelist. Prerequisite: Junior standing or consent of the instructor. **S**

376. W.D. Howells: Realism in Fiction and Criticism. 4 hours. The career of William Dean Howells as journalist, novelist, editor, and critic, and his influence on the development of realism in late nineteenth and early twentieth century American literature. Prerequisite: Junior standing or consent of the instructor. **W**

380. The Rise of Realism. 4 hours. The rise of realism in American fiction from 1850 to 1900: Old Southwest Humor, Local Color, Twain, Howells, Crane, the early naturalists, and others. Prerequisite: Engl. 256. **W**

382. The Plays of Bernard Shaw. 4 hours. A critical, social, and philosophical inquiry. Prerequisite: Junior standing or consent of the instructor. **F**

385. Faulkner and Hemingway. 4 hours. Studies in the short stories and novels of the two writers; examination of their literary theories. Prerequisite: Junior standing or consent of the instructor. **W**

386. Hawthorne and Melville. 4 hours. Two major writers of the nineteenth century; detailed analysis of one major novel of each. Prerequisite: Engl. 255 or consent of the instructor. **S**

387. The Structure of English. 4 hours. Traditional and structuralist grammatical descriptions; introduction to transformational grammatical studies; detailed survey

of a transformational syntax of English; brief introduction to generative phonology and morphophonemic analysis of English, especially stress. Prerequisite: Engl. 301. S, F

388. **Southern Fiction.** 4 hours. Major works. Prerequisite: Junior standing or consent of the instructor. S

389. **Walt Whitman and Emily Dickinson.** 4 hours. The poetry and major prose of Whitman; the poems of Emily Dickinson. Prerequisite: Consent of the instructor or an A or a B in any one of the following: Engl. 256, 289, 302, 307, 323, 324, 345 or 366. W

390. **Modern British Fiction.** 4 hours. A study of representative works of fiction, both short fiction and novels by important modern English writers from Conrad to the present. Prerequisite: Junior standing or consent of the instructor. W, F

392. **The Negro in American Literature: Poetry.** 4 hours. Historical and analytical study of the Negro contribution to American poetry. Prerequisite: Junior standing or consent of the instructor. F

393. **The Negro in American Literature: Prose Fiction.** 4 hours. Historical and analytical study of the Negro contribution to American prose fiction. Prerequisite: Junior standing or consent of the instructor. W

394. **Studies in American-Negro Literature.** 4 hours. Detailed study of aspects of writing by American Negroes. Prerequisite: Junior standing or consent of the instructor. S

FINANCE

340. **Money and Banking.** 4 hours. Monetary and banking systems; the Federal Reserve System; monetary theory; price fluctuations; foreign-exchange financing; specialized financial institutions in the United States. Prerequisite: Econ. 121.

341. **Business Finance.** 4 hours. Nature of business finance and its relation to economics, accounting and law; legal nature and forms of business enterprise; capital, capitalization, and financial planning; financial analysis; initial financing, refinancing, working capital; income administration, including dividend policies; expansion; internal and external financial and economic relationships of the firm. Prerequisites: Econ. 121, Actg. 101 and 102.

342. **Investments.** 4 hours. Types and distinguishing features of securities, security markets, analysis of financial statements and principles of valuation, quality differences, selection of securities to meet varying personal and institutional objectives. Prerequisites: Fin. 340 and 341.

343. **Risk and Insurance.** 4 hours. Basic principles; applications in different areas (life and property insurance); management of risks in the firm (insurance versus self-insurance); social and economic significance of insurance in the economy. Prerequisites: Fin. 340 and 341.

344. Investment Policy. 4 hours. Varying strategies to meet diverse objectives; investments for individuals, business firms, banks, insurance companies, pension and profit-sharing funds; interrelation of investment policies and the economic environment. Prerequisites: Fin. 342 and Econ. 323.

345. Problems in Business Finance. 4 hours. Case studies of problems involving capital budgeting; administration of assets; calculation of financial requirements; provision of funds; dividend policies; special financial problems. Prerequisite: Fin. 341.

FRENCH

101. Elementary French. 4 hours. For students who have not studied French. *Note:* A student must have credit in Fr. 101, 102, and 103 to receive graduation credit in 101. Grammar, pronunciation, reading, composition, conversation. Two additional half hours per week in the language laboratory. W, S

102. Elementary French. 4 hours. Note: A student must have credit in Fr. 102 and 103 to receive graduation credit in 102. Continues Fr. 101. Two additional half hours per week in the language laboratory. Prerequisite: Fr. 101 or the equivalent. W, S

103. Elementary French. 4 hours. Continues Fr. 102. Two additional half hours per week in the language laboratory. Prerequisite: Fr. 102 or the equivalent. W, S, Su

104. Intermediate French. 4 hours. Rapid reading of modern authors, syntax and composition, conversational practice. Prerequisite: Fr. 103 or two years of high school French or the equivalent. W, S

105. Intermediate French. 4 hours. Continues Fr. 104. Prerequisite: Fr. 104 or the equivalent. W, S, Su

106. Intermediate French. 4 hours. Continues Fr. 105. Prerequisite: Fr. 105 or the equivalent. W, S, Su

113. Conversational Practice. 2 hours. Supplements Fr. 104, 105, and 106. Oral practice for the development of elementary conversational skill and the improvement of pronunciation. Prerequisites: Concurrent enrollment in Fr. 104, 105, or 106 and Fr. 103 or two years of high school French. W, S

121. Elementary French, Honors Course. 5 hours. *Note:* For students in the freshman core program. Grammar, pronunciation, reading, composition, conversation. Open only to James Scholars and others with superior linguistic ability. Completion of Fr. 121, 122, and 123 leads directly to Fr. 105. Practice in the language laboratory is required. Prerequisite: Permission of the department.

122. Elementary French, Honors Course. 5 hours. *Note:* For students in the freshman core program. Continues Fr. 121. Practice in the language laboratory is required. Prerequisite: Fr. 121. W

123. Elementary French, Honors Course. 5 hours. *Note:* For students in the freshman core program. Continues Fr. 122. Practice in the language laboratory is required. Prerequisite: Fr. 122. S

201. Introduction to French Literature I. 3 hours. Reading of selected masterpieces. Prerequisite: Fr. 106 or four years of high school French. W, S, Su

202. Introduction to French Literature II. 3 hours. Continues Fr. 201. Prerequisite: Fr. 106 or four years of high school French. W, S

203. Introduction to French Literature III. 3 hours. Continues Fr. 202. Prerequisite: Fr. 106 or four years of high school French. W, S

209. Conversation I. 3 hours. Conversational practice to develop oral facility; exercises for the improvement of pronunciation and diction. Practice in the language laboratory is required. Prerequisite: Fr. 106 or four years of high school French. W

210. Conversation II. 3 hours. Continues Fr. 209. Practice in the language laboratory is required. Prerequisite: Fr. 209. W, S

211. Composition. 3 hours. Training in writing French, translation from English, free composition. Prerequisite: Fr. 106 or four years of high school French. W, S, Su

216. French Literature in Translation. 4 hours. Not open to students majoring or minoring in French. Reading of selected masterpieces of French literature. Prerequisite: Sophomore standing or consent of the instructor. S

241. Social and Cultural History. 3 hours. Social thought and the fine arts as background for the study of French literature. Prerequisites: Fr. 201, 202, and 203 or the equivalents. W

282. Teachers Course. 3 hours. Resources, classroom materials, standard practices, and problems in the teaching of French; practical application to actual classroom situations. Prerequisites: Fr. 201, 202, 203, 209, 210, 211, and 313 or 314; or consent of the instructor.

299. Tutorial Course. 3 to 6 hours. May be repeated once for a maximum of 6 hours. For seniors majoring in French; supplements regular courses. Prerequisites: Senior standing and permission of the department. W, S, Su

313. Stylistics I (Prose). 3 hours. Detailed analysis of the style of selected French authors; practice in advanced composition. Prerequisite: Fr. 211 or consent of the instructor. S

314. Stylistics II (Poetry). 3 hours. Detailed analysis of the style of selected French authors, with practice in advanced composition. Prerequisite: Fr. 211 or consent of the instructor.

317. Modern French Drama I. 3 hours. Major dramatists of the nineteenth and twentieth centuries. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor.

318. **Modern French Drama II.** 3 hours. Continues Fr. 317. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor. W

319. **Modern French Drama III.** 3 hours. Continues Fr. 317 and 318. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor. S

321. **French Literature of the Middle Ages.** 3 hours. Major works, to be read in modern French. Prerequisites: Fr. 201, 202, and 203 or the equivalents.

322. **French Literature of the Sixteenth Century.** 3 hours. Major writers to be read in modern French. Prerequisites: Fr. 201, 202, and 203 or the equivalents. W

323. **French Classical Literature I.** 3 hours. Major French nondramatic writers of the seventeenth century. Prerequisites: Fr. 201, 202, and 203 or the equivalents.

324. **French Classical Literature II.** 3 hours. Major dramatists of the seventeenth century. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor.

325. **French Literature of the Eighteenth Century I.** 3 hours. Major French nondramatic writers of the eighteenth century. Prerequisites: Fr. 201, 202, and 203 or the equivalents. W

326. **French Literature of the Eighteenth Century II.** 3 hours. Major dramatists of the eighteenth century. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor.

327. **French Poetry I.** 3 hours. Major French poets from the fourteenth through the eighteenth centuries. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor.

328. **French Poetry II.** 3 hours. Major French poets of the nineteenth and the early twentieth centuries. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor.

331. **The French Novel of the Nineteenth Century I.** 3 hours. Major novelists. Prerequisites: Fr. 201, 202, and 203 or the equivalents.

332. **The French Novel of the Nineteenth Century II.** 3 hours. Major novelists. Prerequisites: Fr. 201, 202, and 203 or the equivalents.

333. **The French Novel of the Nineteenth Century III.** 3 hours. Major novelists. Prerequisites: Fr. 201, 202, and 203 or the equivalents.

337. **The French Novel of the Twentieth Century I.** 3 hours. Reading and analysis of selected novels from 1900 to 1940. Prerequisites: Fr. 201, 202, and 203 or the equivalents. W

338. **The French Novel of the Twentieth Century II.** 3 hours. Reading and analysis of selected novels from 1940 to the present. Prerequisites: Fr. 201, 202, and 203 or the equivalents. Su

342. **The *Pleiade*.** 3 hours. Theory and practices of the *Pleiade* poets. Prerequisites: Fr. 201, 202, and 203 or the equivalents. S

350. **Preromanticism.** 3 hours. The preromantic movement in France from 1761 to 1814. Prerequisites: Fr. 201, 202, and 203 or the equivalents.

351. **French Romanticism I.** 3 hours. Reading and analysis of selected works tracing the main developments in the Romantic movement from 1815 to 1829. Prerequisites: Fr. 201, 202, and 203 or the equivalents. W

352. **French Romanticism II.** 3 hours. Reading and analysis of selected works tracing main developments in the Romantic movement from 1830 to 1850. Prerequisites: Fr. 201, 202, and 203 or the equivalents. S

355. **Literary and Intellectual Currents of the Eighteenth Century.** 3 hours. Reading and analysis of selected works tracing major literary and intellectual currents. Prerequisites: Fr. 201, 202, and 203 or the equivalents.

360. **Major Trends in French Literature.** 3 hours. Selected writings to illustrate major trends instrumental in formation of critical and esthetic principles of French literature. Prerequisites: Fr. 201, 202, and 203 or the equivalents or consent of the instructor.

362. **The French Novel 1600-1715.** 3 hours. Reading and analysis of selected novels of the period 1600-1715. Prerequisites: Fr. 201, 202, and 203, or consent of the instructor. S

GEOGRAPHY

101. **Physical Geography I: Landforms and Mineral Resources.** 4 hours. The earth and its resources; the earth grid and its portrayal on maps; interpretation of landforms from a geographic point of view; occurrence and use of mineral resources. F, W, S, Su

102. **Physical Geography II: Earth-Sun Relations and Elements of Weather.** 4 hours. Planetary relations; the atmosphere, its composition, function, and behavior in the production of weather types; airmasses and airmass analysis. F, W, S, Su

103. **Physical Geography III: Climate, Vegetation, and Soils.** 4 hours. Climatic types and climatic regions; factors that give order and logic to their areal distribution; biotic and edaphic types and regions in relation to climatic phenomena. Prerequisite: Geog. 102. F, W, S

104. **Cultural Geography I: World Regional Geography.** 5 hours. Geographic structure of the world; regional patterns of settlement and land utilization of resources. F, W, S, Su

105. **Cultural Geography II: World Patterns of Production.** 4 hours. Man's utilization of the major economic resources of the world from the standpoint of geographic patterns and the utilization of resources. F, W, S

109. Basic Maps and Graphics. 4 hours. An introductory course on the use of maps and other graphic materials. Demonstration and evaluation of slides, films, prints, models, and maps for teaching and other purposes. Preparation of representative graphic materials. S

114. Conservation of Natural Resources. 4 hours. The conservation of soil, water, plant, animal, mineral, and recreational resources; general principles of conservation as they apply to the United States. Individual readings and projects are assigned. Prerequisite: One course in geography or consent of the instructor. F, S

123. Geography of Illinois. 3 hours. Detailed regional study of the state; special emphasis on the cultural relations of Illinois to the rest of the nation. Prerequisite: One course in geography or consent of the instructor. W

185. Introduction to Social Science Research Methods. 4 hours. Same as Soc. 185. The application of statistical methods in social science. Topics include research design and the role of statistics in sociological investigation, measures of central tendency and dispersion, simple correlation techniques, contingency analysis, interpretation of survey findings, and introduction to statistical inference. One hour per week of laboratory work in data analysis. Prerequisite: Soc. 100 or 8 hours of geography or 8 hours of sociology or consent of the instructor.

196. Freshman Honors Seminar I. 2 hours. World cities and comparative urbanization. Intensive exposure to the development and pattern of urbanization; to the growth of major integrating centers of political and economic power; to the world cities. Prerequisite: James Scholar or other honors status. S

197. Freshman Honors Seminar II. 2 hours. Regional analysis of the Lower Mekong; physical and cultural landscapes; people and economy; problems of industrialization and political stability; the region as an illustration of an emerging area. Prerequisite: James Scholar or other honors status. W

204. Cultural Geography. 3 hours. Human responses to the earth's physical environment. Major geographic problems in cultural history, cultural areas and distributions, cultural origins and dispersals, cultural landscapes, and cultural ecology. F

205. Areal Organization of Activities. 3 hours. Models relating to the spatial elements of activities with applications to urban and regional growth and development. W

221. The United States and Canada. 4 hours. A survey of the principal economic activities in each of the major geographic regions of North America from the standpoint of their relation to the natural environment. Emphasis on the regional equipment for industry in the several divisions of the continent. Problems and outlook in the major regions of the United States and Canada. Prerequisite: 10 hours of geography or consent of the instructor. F, W, S, Su

225. South America. 4 hours. Regional geography; physical regions, people, economic resources, and political alignments. Prerequisite: 10 hours of geography or consent of the instructor. S

291. **Field Geography. 4 hours.** Class meets on seven selected Saturdays from 8 A.M. to 4 P.M. Field techniques based on observation of physical and cultural landscapes of Chicago metropolitan area, Northern Illinois, and Southern Wisconsin. Prerequisites: Geography major and Geog. 101 and 103. **F**

301. **Fundamentals of Landform Analysis. 3 hours.** Theories of landform processes and techniques of analysis. Prerequisite: Geog. 101 or Geol. 102 or consent of the instructor.

303. **Climates of the Continents. 4 hours.** The world's climates; controls and distribution; problems of classification and regional analysis. Prerequisite: Geog. 103 or consent of the instructor.

326. **Geography of Middle America. 4 hours.** Physical landscapes and the human responses (cultural, economic, and political) to them in Mexico, Central America, and the West Indies. Prerequisite: 10 hours of geography or consent of the instructor. **W**

331. **Western Europe. 4 hours.** A regional analysis of the economic, social, and political development of people in relation to the location of Europe and its natural regions and the physical elements of land relief, climate, soil, and other natural resources. Emphasis on Britain, France, and Germany. Prerequisite: 10 hours of geography or consent of the instructor. **F**

333. **Eastern Asia. 4 hours.** Physical and cultural landscapes of China, Japan, and Korea; physical regions, people, economy, and political alignments. Prerequisite: 10 hours of geography or consent of the instructor. **F**

334. **Southern and Southeastern Asia. 4 hours.** Physical and cultural landscapes; physical regions, people, mineral wealth, agricultural production, manufacturing, trade, political alignments. Prerequisite: 10 hours of geography or consent of the instructor. **S**

336. **The U.S.S.R. 4 hours.** Physical and cultural landscapes; regional analysis of resources and economy; the geographic basis of the nation's role in world affairs. Prerequisite: 10 hours of geography or consent of the instructor. **W**

338. **Africa, South of the Sahara. 4 hours.** A regional analysis of the relationship between natural resources, economic development, and the evolution of the many political units. Prerequisite: 10 hours of geography or consent of the instructor. **S**

351. **Cartography. 4 hours.** Construction of maps and graphs; evaluation of source materials; writing of map specifications; use and care of cartographic equipment; techniques of graphic reproduction. Prerequisite: Consent of the instructor. **F, S**

355. **Map Interpretation and Evaluation. 4 hours.** Evaluation of map components; map reading; historial development of maps; survey of world maps and mapping. Emphasis on the evaluation, interpretation, and use of data portrayed on maps. **W**

361. **Agricultural Regions and Land Utilization. 4 hours.** The nature of land utiliza-

tion from the world, continental, and regional viewpoints; the types of agricultural land use; the interrelationships between areas of different types of land use. **F**

363. **Manufacturing Regions of the World. 4 hours.** World distribution of manufacturing industries. The relative importance of industry in the major economies of the world; factors in the location of principal types of manufacturing; detailed analysis of selected industrial districts. Prerequisite: Junior standing. **W**

365. **Geographic Aspects of Transportation. 4 hours.** Principles; world patterns of land, air, and sea transportation routes, facilities and traffic; relations of transportation to regional development; selected problems in the geographic aspects of railway, highway, and pipeline transportation. Individual projects and readings are assigned. **S**

371. **Urban Geography. 4 hours.** Distribution of cities; urban patterns, forms, and functions; classification of urban centers and tributary areas; systems of urban land classification; forces affecting urban land uses; the geographic aspects of city planning. Prerequisite: Junior standing. **F**

375. **Historical Geography of the United States and Canada. 4 hours.** A regional analysis of the effects of climate, soils, water bodies, and topography on the settlement of the continent; their relationship to present sectional differences. The correlation of history and geography is stressed. Individual projects and readings are assigned. **W**

377. **Political Geography. 4 hours.** World pattern of nations in relation to their natural environment; population and economic factors in world affairs; emphasis on regional concepts and problems of the non-Western world. Individual projects and readings are assigned. **F, S**

391. **Senior Seminar. 3 hours.** Introduction to the theory and technique of geographic research; modern geographic philosophy; interpretive analysis of bibliographic sources and the preparation of a bibliography. Preparation and evaluation of individual papers on selected topics. Prerequisites: Senior standing and declared major or minor in geography. **W**

399. **Special Studies in Geography. 2 to 5 hours.** Reading and reports in selected fields, chosen in consultation with the instructor. Prerequisites: Senior standing and consent of the instructor. **F, W, S, Su**

GEOLOGY

101. **Principles of Geology I. 4 hours.** Analysis of earth's surficial features; weathering and erosion, soils, groundwater, glaciers, streams, oceans and shorelines, deserts. Half-day Saturday field trip required. **W, S, Su, F**

102. **Principles of Geology II. 4 hours.** The origin, age and composition of the earth; introduction to rocks and minerals; metamorphism, magmatic evolution, isostasy, earthquakes, geophysical considerations of earth's interior. **W, S, Su, F**

103. Principles of Geology III. 4 hours. Geologic history and evolution of the earth and its life; geosynclinal theory, uniformitarianism, methods of interpreting earth history. One-day Saturday field trip required. Prerequisites: Geol. 101 and 102 or consent of the instructor. W, S, Su, F

110. Field Work. 3 hours. Observation in the St. Francois Mountains and adjacent parts of Missouri and Illinois. Registration, winter quarter. Two three-hour class meetings. Held during spring vacation. Credit is given on completion of a satisfactory written report. Prerequisite: Geol. 102 or 150, or PSci. 103. W

111. Principles of Geology. 1 hour. For honors students. Field, laboratory, and/or library work. The course may be taken three times, each time with coregistration in Geol. 101, 102, or 103, or once with coregistration in Geol. 150. Prerequisite: Concurrent registration in the honors section of Geol. 101, 102, 103, or 150 or consent of the instructor. W, S, F

150. Geology for Engineers. 4 hours. Application of elementary geology to engineering. Prerequisite: Sophomore standing in the College of Engineering. W, S, F

204. Crystallography. 4 hours. Morphological, optical, and introductory structural crystallography; features of mineralogical significance. Prerequisite: one quarter of college chemistry. F

205. Mineralogy. 4 hours. Origin and properties of common minerals. Crystal chemistry of major mineral groups. Laboratory study and identification of minerals and rocks. Prerequisite: Geol. 204. W

206. Petrology. 4 hours. Origin, occurrence and chemical characteristics of igneous and metamorphic rocks. Introduction to phase equilibria. Laboratory emphasizes application of petrographic and X-ray diffraction techniques to problems of rock genesis. Prerequisite: Geol. 205. S

218. Introduction to Paleontology. 4 hours. Same as BioS. 218. The phylogeny, morphology, and ecology of fossils; emphasis on the invertebrates. Two or three Saturday field trips are required. Prerequisite: One year of biological sciences or consent of the instructor. F

219. Stratigraphy and Sedimentation I. 4 hours. Origin, description, and interpretation of sedimentary rocks. Prequisite: Geol. 103. W

220. Stratigraphy and Sedimentation II. 4 hours. Continues Geol. 219. Prerequisite: Geol. 219. S

240. Economic Geology. 4 hours. Principles and techniques of mineral exploration, evaluation, and exploitation. Origin and occurrence of economic mineral materials, including petroleum and natural gas. Prerequisite: Consent of the instructor. W

299. Introduction to Research. Credit to be arranged. Independent study. Each student who desires to register must present to the head of the department a written statement from the instructor under whom he is to work. Only those students

who write a thesis are recommended for graduation with departmental distinction. Prerequisite: Consent of the instructor. W, S, F

303. **Advanced Physical Geology I. 4 hours.** The physical nature of the earth; the manner in which the materials of the earth determine its erosion and its structure. Prerequisites: A year of chemistry, physics, calculus, and geology. W

304. **Advanced Physical Geology II. 4 hours.** The chemical nature and history of the earth's crust. Prerequisite: Geol. 303. S

316. **Invertebrate Paleontology. 4 hours.** Same as BioS. 316. Phylogeny, morphology, and ecology of the fossil invertebrates. Prerequisites: Geol. 218 and consent of the instructor. F

317. **Field Geology in the Rocky Mountains. 12 hours.** Conducted from a locality in the Rocky Mountains. Field training in stratigraphy, structure, and geomorphology; geologic mapping with plane table and serial photographs. Approximate cost $250 to $305. Prerequisite: Geol. 103 or consent of the instructor.

318. **Vertebrate Paleontology. 4 hours.** Same as BioS. 318. Phylogeny, morphology, and ecology of the fossil vertebrates.

319. **Paleobotany. 4 hours.** Same as BioS. 319. Structure, phylogeny, and stratigraphic distribution of representative fossil plants. Lecture, laboratory, and field trips. Prerequisite: One year of biological sciences.

335. **Geochemistry. 4 hours.** Principles of the distribution of the elements in the earth's crust. Geologically pertinent phase equilibria. Geochronology and isotope distributions in the earth's crust. Prerequisites: Chem. 112, 113, 114 or consent of the instructor.

340. **Introduction to Oceanography. 4 hours.** A physical description of the marine environment: the physical and chemical properties of sea water; currents, wave action, tidal forces, geography and geology of the ocean basins. Relation of the marine organism to the physical environment. Prerequisite: Consent of the instructor. S, F

345. **Advanced Crystallography. 4 hours.** Crystalline properties of minerals. Theory and practice of determining the crystalline structure of minerals. Prerequisite: Geol. 205 or consent of the instructor. S

350. **Hydrogeology. 4 hours.** The occurrence, storage, movement, and quality of water in rocks of the earth's crust. Prerequisite: Credit or concurrent registration in calculus.

360. **Introductory Geophysics. 4 hours.** The shape and figure of the earth, gravity, seismology, and magnetism. Thermodynamics of the earth; atmospheric and planetary geophysics. Prerequisite: Consent of the instructor. F

370. **Engineering Geology. 4 hours.** Applications of geology to major engineering problems and operations. Prerequisite: Geol. 101 or 150 or consent of the instructor. S

GERMAN

101. Elementary German. 4 hours. *Note*: A student must have credit in Ger. 101, 102, and 103 to receive graduation credit in 101. Reading, grammar, and simple oral practice. Four additional half hours per week in the language laboratory. W, S, Su, F

102. Elementary German. 4 hours. *Note*: A student must have credit in Ger. 102 and 103 to receive graduation credit in 102. Continues Ger. 101. Four additional half hours per week in the language laboratory. Prerequisite: Ger. 101 or the equivalent. W, S, Su, F

103. Elementary German. 4 hours. Continues Ger. 102. Four additional half hours per week in the language laboratory. Prerequisite: Ger. 102 or the equivalent. W, S, Su, F

104. Intermediate German. 4 hours. Reading, grammar review, and oral communication. Four additional half hours per week in the language laboratory. Prerequisite: Ger. 103 or 122 or the equivalent. W, S, Su, F

105. Intermediate German. 4 hours. Continues Ger. 104. Four additional half hours per week in the language laboratory. Prerequisite: Ger. 104 or 123 or the equivalent. W, S, Su, F

106. Intermediate German. 4 hours. Continues Ger. 105. Four additional half hours per week in the language laboratory. Prerequisite: Ger. 105 or 135 or the equivalent. W, S, Su, F

108. Intensive German. 5 hours. An accelerated course for beginners. Primarily for those seeking reading ability in scientific or technical material in the humanities, social sciences, and natural sciences. Open to juniors and seniors. W

109. Reading German. 3 hours. A review course designed to prepare students for reading examinations in German and to provide guidance and practice in interpreting specialized texts. Open to juniors and seniors. Prerequisite: Ger. 108 or the equivalent. S

113. Intermediate Composition and Conversation I. 2 hours. Prerequisite: Credit or concurrent registration in Ger. 104. F

114. Intermediate Composition and Conversation II. 2 hours. Continues Ger. 113. Prerequisite: Ger. 113 or the equivalent or consent of the instructor. W

115. Intermediate Composition and Conversation III. 2 hours. Continues Ger. 114. Prerequisite: Ger. 114 or the equivalent or consent of the instructor. S

121. Elementary German. Honors Course. 5 hours. Reading, grammar, and simple conversation. Completion of Ger. 121, 122, and 123 leads to Ger. 105 or 135. Four classes and six half hours per week in the language laboratory. Open only

to James Scholars and others with superior linguistic ability. Prerequisite: Permission of the department. **F**

122. Elementary German. Honors Course. 5 hours. Continues Ger. 121. Four classes and six half hours per week in the language laboratory. Prerequisites: Ger. 121 or the equivalent and permission of the department. **W**

123. Elementary German. Honors Course. 5 hours. Continues Ger. 122. Four classes and six half hours per week in the language laboratory. Prerequisites: Ger. 122 or the equivalent and permission of the deparment. **S**

134. Intermediate German. 5 hours. Special course. Reading, writing, understanding, and speaking. Primarily for prospective German majors, but open to others. Four classes and six half hours per week in the language laboratory. Prerequisites. Ger. 103 or the equivalent.

135. Intermediate German. 5 hours. Special course. Continues Ger. 134. Four classes and six half hours per week in the language laboratory. Prerequisite: Ger. 123 or 134, or 104 and 113, or the equivalent.

136. Intermediate German. 5 hours. Special course. Continues Ger. 135. Four classes and six half hours per week in the language laboratory. Prerequisite: Ger. 135 or 105 and 114 or the equivalent.

201. Writing and Speaking German I. 4 hours. One to four additional half hours per week in the language laboratory. Phonetics, grammar, syntax, vocabulary development; training in oral and written communication. Prerequisite: Ger. 106 or the equivalent. **W, F**

202. Writing and Speaking German II. 4 hours. One to four additional half hours per week in the language laboratory. Continues Ger. 201. Prerequisite: Ger. 201 or the equivalent. **W, S**

203. Writing and Speaking German III. 4 hours. One to four additional half hours per week in the language laboratory. Continues Ger. 202. Prerequisite: Ger. 202 or the equivalent. **S, F**

204. Corrective German Phonetics. 1 hour. May be repeated once for credit. Pronunciation and intonation practice. Prerequisite: Ger. 106 or the equivalent. **W, S, F**

216. German Literature in Translation. 4 hours. A survey of significant works of literature from Lessing to the present. **W**

218. Franz Kafka. 4 hours. Given in English. An intensive study of the major works and selections from the short stories, letters, and diaries. Prerequisite: Junior standing or consent of the instructor.

219. Thomas Mann. 4 hours. Given in English. A detailed study of the three major novels and selections from the short stories and essays. Prerequisite: Junior standing or consent of the instructor.

220. German Culture and Civilization. 3 hours. A survey of the development of Ger-

man culture from earliest times to the present: art, architecture, music, society. Lectures, selected readings, and slides. Prerequisite: Junior standing or consent of the instructor. **W**

221. Introduction to German Literature. 3 hours. A linguistic and literary introduction to the various genres. Prerequisite: Ger. 106 or the equivalent. **S, F**

290. Masterworks of German Literature I. 4 hours. The classical period. Prerequisite: Ger. 221 or the equivalent. **W**

292. Masterworks of German Literature II. 4 hours. Romanticism and poetic realism. Prerequisite: Ger. 221 or the equivalent. **S**

294. Masterworks of German Literature III. 4 hours. From Naturalism to the present. Prerequisite: Ger. 221 or the equivalent. **F**

299. Independent Study. 1 to 3 hours. May be repeated for credit. Open only to German majors and minors who are working on special projects. Prerequisites: Ger. 106 or the equivalent and consent of the department. **W, S, F**

301. Writing and Speaking German IV. 4 hours. Continues Ger. 203. Prerequisite: Ger. 203 or the equivalent. F

302. Writing and Speaking German V. 4 hours. Continues Ger. 301. Prerequisite: Ger. 301 or the equivalent. S

305. Introduction to Linguistics. 3 hours. Study of German phonology, morphology, syntax, and semantics in comparison with English. Prerequisite: Ger. 202 or the equivalent. **S**

331. The Teaching of German in the Secondary School and College. 3 hours. Modern techniques including the use of the language laboratory, in the teaching of German. Prerequisite: Ger. 305. **F**

350. Senior Seminar and Thesis I, Honors Course. 3 hours. Primarily for candidates for honors in German. Prerequisites: Ger. 203, 290, 292, and at least a B average in previous German courses. **F**

351. Senior Seminar and Thesis II, Honors Course. 3 hours. Continues Ger. 350. Prerequisite: Ger. 350. **S**

385. The German Novelle. 4 hours. Reading and interpretation of representative *Novellen* of the nineteenth and twentieth centuries. Prerequisites: Ger. 202 and 292, or the equivalents. **F**

395. Naturalism, Impressionism, and Expressionism. 4 hours. Intensive study of the literature and programmatic writing of the period from 1885 to 1925. Prerequisites: Ger. 202 and 294 or the equivalents. **S**

396. German Drama. 4 hours. Development of the German drama from the Enlightenment to the present. Prerequisites: Ger. 202, 221, and one other course in German literature or the equivalents. **S**

397. German Romanticism. 4 hours. Literature, theories, and philosophy of eighteenth and nineteenth century Romanticism. Prerequisites: Ger. 202, 290, and 292, or the equivalents. W

398. Goethe's *Faust*. 4 hours. Intensive study of Parts I and II. Prerequisites: Ger. 202, 290, 292, or the equivalents. W, Su

399. Research Projects. 1 to 3 hours. May be repeated for credit. Open only to German majors working on specialized research. Prerequisite: Permission of the department. W, F

GREEK

100. Classical Greek. 4 hours. Not open to majors in Greek. Intensive introductory course. Rapid introduction to the language of Homer and Plato, based on extensive readings from many authors of the classical period (700-300 B. C.). Designed for students who wish sufficient training to read on their own.

101. Elementary Greek I. 4 hours. *Note:* A student must have credit in Gr. 101, 102, and 103 to receive graduation credit in 101. The fundamentals of ancient classical Greek, including the reading of simple prose. Eligibility will be tested in the first meeting.

102. Elementary Greek II. 4 hours. *Note:* A student must have credit in Gr. 102 and 103 to receive graduation credit in 102. Continues Gr. 101. Grammar and reading. Prerequisite: Gr. 101 or the equivalent. W

103. Elementary Greek III. 4 hours. Continues Gr. 102. Prerequisite: Gr. 102 or the equivalent. S

104. Intermediate Greek I. 4 hours. Introduction to epic poetry. Selections from Homer. Prerequisite: Gr. 103 or the equivalent. F

105. Intermediate Greek II. 4 hours. Introduction to dramatic poetry. Prerequisite: Gr. 104 or the equivalent. W

106. Intermediate Greek III. 4 hours. Introduction to philosophic prose: Study of Plato's *Socratic Dialogues*. Prerequisite: Gr. 105 or the equivalent. S

201. Xenophon: *Hellenica*, Books I and II. 4 hours. Reading and translation. Prerequisite: Gr. 106 or the equivalent.

202. Plato: *Socratic Dialogues*. 4 hours. Reading and translation of at least two of the following: *Apology, Crito, Charmides, Laches, Euthyphro, Hippias Minor, Ion*. Prerequisite: Gr. 106 or the equivalent.

203. Attic Orators. 4 hours. Reading and translation of selected orations by one or more of the Attic orators. Prerequisite: Gr. 106 or the equivalent.

299. **Independent Reading. 4 hours.** Individual study under faculty direction. For students qualified by preparation and interest. Prerequisite: Gr. 201 or the equivalent. W, S, F

HEALTH SCIENCE

180. **Personal and Community Health. 3 hours.** Fundamentals of medical science; dynamics of health in the individual, the family, and the community. Scientific prevention of illness; health protection; principles of treatment of common medical problems.

240. **Mental Health in the Modern Urban Community: Problems and Prospects. 3 hours.** Definition of urban problems and their impact upon the mental health of the individual, the family, and the community. Health, education, housing, ethnic, racial, employment, criminal, and other factors—their impact on individuals and families. Evaluation of programs for prevention and processes of treatment from the viewpoint of the individual and the community. Prerequisite: Sophomore standing. HSci. 180 is recommended.

HISTORY

110. **History of Europe from 800 to 1450. 4 hours.** The rise and development of the medieval church, the organization of the feudal monarchies, the laying of the foundation for western European economy, cultural and intellectual developments of the Middle Ages. W, S

111. **History of Europe from 1450 to 1750. 4 hours.** The rise of the modern bureaucratic state; emphasis on the contribution of religious, economic, and intellectual developments of the sixteenth and seventeenth centuries to the emergence of the modern state, in both international and internal politics. W, S, Su

112. **History of Europe from 1750 to 1870. 4 hours.** Transfer of power of kings, who ruled by Divine Right, to representatives elected to defend popular sovereignty; Bourgeois Revolution, consolidation of nationalism and popular sovereignty. W, S, Su

113. **History of Europe from 1870 to the Present. 4 hours.** Expansion of industrial powers and resultant imbalance in European society; change from agrarian to urban civilization with alteration in balance of power that led to the two great wars, subsequent political problems. W, S, Su

131. **History of England to 1485. 4 hours.** England from the Celtic immigration to the accession of Henry VII. Su

132. **History of England from 1485 to 1714. 4 hours.** England during the reigns of the Tudors and the Stuarts. W, Su

133. **History of England from 1714 to the Present. 4 hours.** England from the accession of the Hanoverians. S, Su

151. **History of the United States to the 1820's. 4 hours.** From colony to nationhood; European foundations; colonial developments; independence and early nationhood. **W, S, Su**

152. **History of the United States from the 1820's to the 1890's. 4 hours.** America in the nineteenth century: the making of an independent nation. Jacksonian democracy, changing political issues and parties, the Civil War, Reconstruction, the consequences of the Industrial Revolution. **W, S, Su**

153. **History of the United States from 1890 to the Present. 4 hours.** American politics in the twentieth century; adjustment to world power; problems of economic and social change in modern times. **W, S, Su**

Note: 200-level and 300-level courses are restricted to juniors, seniors and to those lower-division students who have the consent of the instructor.

201. **History of Education. 4 hours.** History of education from Antiquity to the Counter-Reformation, in relation to social, political and religious influences; development of education and educational institutions in the context of factors in European history which affected conceptions of learning and teaching; tensions between different ideals of learning, and their influence upon schools and curricula. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

223. **Russia from the Varangians to the Death of Peter the Great. 4 hours.** The Russian people, state, and culture—from their origins to the death of Peter the Great (1725). Individual conferences on assigned papers are required. Prerequisite: One year of European history or consent of the instructor. **W**

224. **Russia in the Imperial Age. 4 hours.** Political, diplomatic, intellectual, and social developments in the Russian Empire from the death of Peter the Great to the Revolution of 1905. Individual conferences on assigned papers are required. Prerequisite: One year of European history or consent of the instructor. **W, S**

225. **The Russian Revolution and the New Regime. 4 hours.** Russian and Soviet political, diplomatic, ideological, economic, social, and cultural developments during the Duma period, World War I, the Russian Revolution and war communism, the NEP, the Five Year Plans. Individual conferences on assigned papers are required. Prerequisite: One year of European history or consent of the instructor. **S, Su**

231. **Colonial Latin America. 4 hours.** Iberian discovery, conquest and settlement of America; the establishment of Spanish and Portuguese institutions; social, economic, political, and cultural development in colonial societies from conquest to independence. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

232. **Latin America in the Nineteenth Century. 4 hours.** The independence of Latin America and the establishment of the new nations. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. **W**

233. Modern Latin America. 4 hours. The Latin American nations in the twentieth century; their social, economic, political, and cultural development and their struggles for modernization. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

281. The Ancient World: Prehistory and the Ancient Orient. 4 hours. The evolution of civilization. Ancient civilization prior to the Greeks. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. Su

282. The Ancient World: Greece to the Age of Alexander. 4 hours. The development of Greek civilization from the Helladic to the Hellenistic period. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W

283. The Ancient World: Rome. 4 hours. The development of Roman civilization from the eighth century B.C. to the fall of the Roman Empire. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

299. Individual Study: Special Topics. 2 to 5 hours. May be repeated for credit. Selected topics in history for individual investigation. Prerequisite: Consent of the instructor. W, S

301. Church and State in Medieval Europe, the Eleventh Through the Twelfth Centuries. 4 hours. The development of papal centralization from 1049 to 1123, beginning with an examination of the church under feudal domination, the reforms of the Saxon and Salian emperors and the origins of papal independence are investigated. The basic opposition between imperial and papal assertions of hegemony and the dispute over lay investiture as an aspect of the controversy are the focal points for study of the ecclesiology of Gregory VII and his successors. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

302. Byzantine Civilization from 330 to 1054. 4 hours. The cultural, religious, and social history of the Eastern Roman Empire from the founding of Constantinople to 1054. Special attention to the continuation of classic ideals and Byzantine relations with the Latin West and the Slavic, especially Russian, worlds. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

303. History of Byzantine Civilization from 1054 to 1453. 4 hours. The cultural, religious, and social history of the Eastern Roman Empire from 1054 to the fall of Byzantium in 1453. Special attention to the continuation of classic ideals and Byzantine relations with the Latin West and the Slavic, especially the Russian, worlds. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

304. Intellectual History of the Medieval Western World. 4 hours. Intellectual and religious thought and learning from the Age of the Fathers to Dante and William of Occam. Some attention is given to cross-cultural relations with the Byzantine

and Islamic East. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

305. **The Middle Ages from 400 to 814. 4 hours.** Europe from the time of the barbarian invasions to the death of Charlemagne. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

306. **The Middle Ages from 814 to 1250. 4 hours.** Europe from the death of Charlemagne to the death of Frederick II. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S

307. **The Middle Ages from 1250 to 1500. 4 hours.** Europe from the rise of the towns to the establishment of national monarchy. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

308. **The Renaissance. 4 hours.** Major intellectual, cultural, political, social, and economic developments and issues of Renaissance Europe. Individual conferences on assigned papers are required. Prerequisites: Junior standing and one course in history or consent of the instructor. S

311. **The Age of the Reformation. 4 hours.** The Protestant and Catholic reformations of the sixteenth century. Individual conferences on assigned papers are required. Prerequisite: Junior standing or one year of European history. S

312. **The Age of Philip II. 4 hours.** Europe during the second half of the sixteenth century, the age of Spanish Imperialism; religious war and economic expansion. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S

313. **Sixteenth Century Civilization in Europe. 4 hours.** European culture from the generation of Copernicus to the generation of Galileo. The origins of modern thought and ideology studied in the context of sixteenth century society. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S

314. **Europe in the Seventeenth Century. 4 hours.** Major political, religious, economic, social, and cultural developments and issues of seventeenth century Europe. The growth of the French monarchy, the Hapsburg Empire, the Thirty Years' War, the English constitutional crises, international problems and politics, political theory, the scientific revolution, and economic and social problems. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

315. **Europe in the Eighteenth Century. 4 hours.** Major features of the structure and operations of the international relations, diplomacy, and warfare of the eighteenth century; economic and political systems of the major states of western Europe from 1715 to 1789. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

316. **Europe from 1789 to 1848. 4 hours.** The French Revolution; Napoleon and the emergence of a new Europe with the forces of liberalism, nationalism, Romanti-

cism, and conservatism; the meeting of these forces in the revolutions of 1848. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. Su

317. **Europe from 1848 to 1914: Unification, Power, and Conflict. 4 hours.** The unification of Germany and Italy, the rise of industrialism and the new imperialism, the advent of *Realpolitik* and the background of World War I. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S

318. **Europe from 1914 to the Present. 4 hours.** The contentions among fascism, communism, and liberal democracy to reconstitute Europe after 1918. The background of World War II and Europe in a cold war. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S

319. **European Diplomatic History from 1648 to 1814. 4 hours.** The foreign policy of European states from the Treaty of Westphalia to the fall of Napoleon. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

320. **European Diplomatic History from 1814 to 1878. 4 hours.** The foreign policy of European states from the fall of Napoleon to the Congress of Berlin. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S

321. **The Diplomacy of Imperialism from 1878 to the Present. 4 hours.** European relations with the non-European world: late nineteenth century imperialism, the creation, administration, and disintegration of colonial empires and the emergence of new nations in an age of decolonization. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

322. **The Scientific Revolution of the Seventeenth Century. 4 hours.** The emergence of modern science as a mode of thought; its implications for the history of early modern Europe. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

323. **Ideas and Ideologies in Nineteenth Century European Thought. 4 hours.** Major ideas and ideologies of Europe in the nineteenth century, from Romanticism to late-century Social Darwinism. Prerequisite: One year of modern European history. W, Su

324. **Ideas and Ideologies in Twentieth Century Thought. 4 hours.** Important intellectual trends in the modern world; Freudianism and the new science of man, Spenglerian "decline of the West," Marxism-Leninism, the irrationalism of fascism, the post-war existentialist dilemma. Prerequisites: Hist. 323 and one year of European history. S

325. **Italian History from 1815 to 1870. 4 hours.** The impact of the French Revolu-

tion, the *Risorgimento,* the creation of the Italian nation-state, and the early years of the Kingdom of Italy. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W

326. **Italian History from 1870 to the Present. 4 hours.** The development of the Italian national state: the political, social, and economic problems of Italy before World War I, the church-state relationship, colonial ambitions, the fascist corporate state, the Italian Republic since World War II. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

327. **German History from 1618 to 1740. 4 hours.** The Thirty Years' War: its political, economic, and social effects on German public life. The rise of absolutism, the decline of the *Reich,* economic reconstruction and cameralism, the changing structure of social relationships. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

328. **German History from 1740 to 1848. 4 hours.** The rise of Prussia and Austro-Prussian dualism; enlightened absolutism in Germany; Germany in the revolutionary period; the rise of political ideologies and middle-class culture; the revolutions of 1848. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W

329. **Modern Germany from 1848 to the Present. 4 hours.** Germany's political, economic, and social reaction to the problems of national unification, industrialism, liberalism, world-power status and rejuvenation after the loss of that status in the two World Wars. Individual conferences on assigned papers are required. Prerequisites: Junior standing and one year of European history or consent of the instructor. S

337. **Tudor England from 1485 to 1603. 4 hours.** The major political, constitutional, social, economic, and cultural developments and issues of Tudor England. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

338. **Stuart England from 1603 to 1714. 4 hours.** The major political, constitutional, social, economic, and cultural developments and issues of Stuart England. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

339. **Eighteenth Century England from 1714 to 1815. 4 hours.** From the accession of the Hanoverians to the end of the Napoleonic Wars. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

340. **Nineteenth Century England from 1815 to 1886. 4 hours.** From the end of the Napoleonic Wars to the Home Rule election. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W

341. **Twentieth Century England from 1886 to the Present. 4 hours.** From the Home Rule election to the present. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

343. **English Constitutional History to 1485. 4 hours.** The foundation and development of British constitutional, political, and legal institutions from Anglo-Saxon times to the accession of the Tudor dynasty. Individual conferences on assigned papers are required. Prerequisite: One year of British history or one year of medieval history or consent of the instructor. W

344. **English Constitutional History from 1485 to the Present. 4 hours.** Growth, development, and change in British constitutional, political, legal, and imperial institutions from the accession of the Tudor dynasty to the present. Individual conferences on assigned papers are required. Prerequisite: One year of British history or one year of modern European history or consent of the instructor. S

345. **History of Western Africa and the Sudan. 4 hours.** Development of native African states from earliest times; the impact of European and other alien influences on the continent; the emergence of the modern independent African states. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

346. **Eastern Africa and the Horn. 4 hours.** The development of native African states from earliest times; the impact of European and other alien influences on the continent; the emergence of modern independent African states. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

347. **Southern Africa and the Congo. 4 hours.** Development of native African states from earliest times; the impact of European and other alien influences on the continent; the emergence of modern independent African states. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

348. **The Portuguese Empire in Brazil. 4 hours.** Portuguese discovery, settlements and exploitation of Brazil during three centuries; the creation of the Brazilian nation through an amalgamation of races and cultures in a plantation and mining economy. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

349. **Monarchy in Brazil from 1808 to 1889. 4 hours.** The foundation of Brazilian independence; the consolidation of the nation; its economic, social, political, and intellectual development. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W

350. **Modern Brazil from 1889 to the Present. 4 hours.** The Conservative republic, the revolution of 1930, the Vargas era, economic, social, and cultural development, and the struggle for modernization. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

351. **Discovery and Settlement of the Americas in the Sixteenth and Seventeenth Centuries. 4 hours.** The development of the Americas; early phases of European interests in the Atlantic Community; the first century of British North America. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

352. **British North America from 1690 to 1765. 4 hours.** The duel with France for empire; the development of British North America to the eve of American independence. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, Su

353. **The Development of the American Nation from 1765 to 1801. 4 hours.** The background for independence; the American Revolution; the establishment of government. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S, Su

354. **The New Nation: The United States from 1789 to 1828. 4 hours.** The establishment of the American nation under the constitution. Emergence of the political-party system; westward expansion; the growth of nationalism and sectionalism. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S, Su

355. **The Jacksonian Age: The United States from 1828 to 1848. 4 hours.** Political, social, and cultural developments during the middle period. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

356. **Expansion and Conflict: The United States from 1848 to 1865. 4 hours.** Causes and events leading to the Civil War; Lincoln and the war. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

357. **The Politics of Reform in Industrial America from 1877 to 1912. 4 hours.** Agrarian protest, organization of labor, third-party movements, and progressivism in the period of rapid social and economic change at the turn of the century. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

358. **Response to Crisis: Twentieth Century America in War and Depression from 1912 to 1939. 4 hours.** The American response to World War I and to the depression of the 1930's. Analysis of political, social, economic, and intellectual tendencies. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

359. **Studies in Contemporary American History: The United States from 1939 to the Present. 4 hours.** World War II, post-war diplomacy, political, social, economic, and intellectual tendencies. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

360. **Reconstruction: The United States from 1865 to 1877. 4 hours.** Reconstruction of the Union following the Civil War. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

361. **The Land and the Nation. 4 hours.** Analysis of the influence of public domains on American development, from colonial times until the Civil War. Emphasis on political, institutional, constitutional, and ideological topics. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

362. **The United States and Its Natural Heritage. 4 hours.** Analysis of the contest that developed after 1865 for the control and utilization of America's natural resources. Emphasis on political, institutional, economic, social, and ideological topics. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

363. **American Intellectual and Social Thought from 1600 to 1830. 4 hours.** Representative cultural statements from American Puritanism, the Enlightenment, Romanticism, and Pragmatism. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. Su

364. **American Intellectual and Social Thought from 1831 to 1890. 4 hours.** Representative cultural statements from American Puritanism, the Enlightenment, Romanticism, and Pragmatism. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W

365. **Development of the American Economy from 1607 to 1815. 4 hours.** Analysis of the main currents and factors in the economic development of the United States from colonial times to the War of 1812. Special attention to the relationship of economic institutions and activities to social and political trends in American civilization. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

366. **Development of the American Economy from 1815 to 1917. 4 hours.** Analysis of the main currents and factors in the economic development of the United States from the War of 1812 to World War I. Special attention to the relationship of economic institutions and activities to social and political trends in American civilization. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W, S

367. **The Diplomatic History of the United States from 1775 to 1880. 4 hours.** The development of American relationships in the New World and with the nations of Europe and Asia. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. W

368. **The Diplomatic History of the United States from 1880 to the Present. 4 hours.** The emergence of the United States as a world power. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

369. **Constitutional Development of the United States to 1840. 4 hours.** Individual conferences on assigned papers are required. Prerequisite: One year of United States history or British history or political science.

370. **Constitutional Development of the United States from 1840 to 1900. 4 hours.** Individual conferences on assigned papers are required. Prerequisite: One year of United States history or British history or political science. W

371. **Constitutional Development of the United States in the Twentieth Century. 4 hours.** Individual conferences on assigned papers are required. Prerequisites: One year of United States history, British history, or political science and junior standing or consent of the instructor. S

372. **Development of the American Economy from 1917 to the Present. 4 hours.** Analysis of the main currents and factors in the economic development of the United States since World War I. Special attention to the relationship of economic institutions and activities to social and political trends in American civilization. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor. S

373. **American Urban History: The Colonial Period to the 1860's. 4 hours.** The major causes for and the consequences of the emergence of American cities from the seventeenth century to the Civil War. Individual conferences on assigned papers are required. Prerequisite: One year of introductory American history or consent of the instructor.

374. **American Urban History: The 1860's to the Present. 4 hours.** The major causes for and consequences of the emergence of the industrialized city: industrial revolution, labor movement, architectural revolution, ethnic groups, housing, health, social reform, and others. Individual conferences on assigned papers are required. Prerequisite: One year of introductory American history or consent of the instructor. W

375. **Studies in American Urban History. 4 hours.** Individual training in research in urban history and discussion of selected major problems of American urbanization. Individual conferences on assigned papers are required. Prerequisites: Hist. 373 and 374 or consent of the instructor. S

376. **American Intellectual and Social Thought from 1891 to the Present. 4 hours.** Representative cultural statements from American Puritanism, the Enlightenment, Romanticism, and Pragmatism. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

377. **American Negro History: Colonial Period Through Reconstruction. 4 hours.** The history of the Negro in America and American race relations, from the seventeenth century to 1877. Individual conferences on assigned papers are required. Prerequisite: One year of introductory American history or political science or sociology or consent of the instructor.

378. **American Negro History: Reconstruction to the Present. 4 hours.** The history of the Negro in America and American race relations from 1877 to the present. Individual conferences on assigned papers are required. Prerequisite: One year of American history or political science or sociology or consent of the instructor. W

379. **Studies in American Negro History. 4 hours.** Individual training in research in American Negro history and examination of selected major problems. Prerequisites: Hist. 377 and 378 or consent of the instructor. S

381. **Greek History from 750 to 478 B.C. 4 hours.** The political, social, and economic development of Greece from the end of the Dark Ages to the defeat of the Persian invader. Individual conferences on assigned papers are required. Prerequisites: Junior standing and Hist. 282 or consent of the instructor.

383. **The Roman Revolution from 146 to 30 B.C. 4 hours.** The political, social, and

economic history of Rome from the Gracchan crisis to the end of the Republic. Individual conferences on assigned papers are required. Prerequisites: Junior standing and Hist. 283 or consent of the instructor.

384. The Roman Empire, the Second Through the Sixth Centuries, A.D. 4 hours. The Roman Empire as a bridge between antiquity and medieval civilization. The decay of imperial institutions as a result of social tensions and economic problems and attempts at imperial reform. Christianity in the empire and the rise of the papacy. The Germanic invasions and the establishment of the western kingdoms. Individual conferences on assigned papers are required. Prerequisites: Junior standing or consent of the instructor.

388. Greek and Roman Historiography. 4 hours. Analysis of the most important historians of classical antiquity, including their backgrounds, motives, interests, techniques, prejudices, and philosophies of history. Individual conferences on assigned papers are required. Prerequisites: Junior standing and Hist. 282 or 283, or consent of the instructor.

389. The American Historians from 1607 to 1876. 4 hours. Major American historians; analysis of their works as expressions of American culture. Emphasis on the role which history has played in American life and thought. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

390. Proseminar in American History. 4 hours. May be repeated for credit. Selected topics for special study. Individual conferences on assigned papers are required. Prerequisite: Consent of the instructor. W, S

391. The American Historians from 1877 to the Present. 4 hours. Major American historians; analysis of their works as expressions of American culture. Emphasis on the role which history has played in American life and thought. Individual conferences on assigned papers are required. Prerequisite: Junior standing or consent of the instructor.

392. Proseminar in Modern European History. 4 hours. May be repeated for credit. Selected topics for special study. Individual conferences on assigned papers are required. Prerequisite: Consent of the instructor. S

394. Proseminar in English History. 4 hours. May be repeated for credit. Selected topics for special study. Individual conferences on assigned papers are required. Prerequisite: Consent of the instructor.

395. Proseminar in Medieval History. 4 hours. May be repeated for credit. Selected topics for special study. Individual conferences on assigned papers are required. Prerequisite: Consent of the instructor.

396. Proseminar In Russian History. 4 hours. May be repeated for credit. Selected topics for special study. Individual conferences on assigned papers are required. Prerequisite: Consent of the instructor.

HUMANITIES

101. World Literature I: The Ancient World. 4 hours. Masterpieces of world literature from earliest times to the present, in English and in English translation. W, S, Su, F

102. World Literature II: The World of the Middle Ages and the Renaissance. 4 hours. Continues Hum. 101. W, S, Su, F

103. World Literature III: The Modern World from 1700 to the Present. 4 hours. Continues Hum. 102. W, S, Su, F

106. Modern World Literature I: 1715-1815, Honors Course. 4 hours. For students in the freshman core program. Masterpieces from the death of Louis XIV of France to the Congress of Vienna. In English and in English translation. Prerequisite: Admission to the core program. F

107. Modern World Literature II: 1815-1914, Honors Course. 4 hours. For students in the freshman core program. Masterpieces dating from the Congress of Vienna to World War I. In English and in English translation. Prerequisite: Hum. 106 and admission to the core program. W

108. Modern World Literature III: 1914 to the Present, Honors Course. 4 hours. For students in the freshman core program. Masterpieces from World War I to the present. In English and in English translation. Prerequisites: Hum. 107 and admission to the core program. S

151. The Heritage of Western Culture I. 4 hours. The tragedy of the human condition. Prerequisite: Sophomore standing. F

152. The Heritage of Western Culture II. 4 hours. The individual and the state. Prerequisite: Sophomore standing. W

153. The Heritage of Western Culture III. 4 hours. The effect of the conflict between Judaeo-Christian and Greek classical influences on our cultural patterns. Prerequisite: Sophomore standing. S

201. Classic Literature of the Orient. 4 hours. Introduction to the thought of the Orient through readings in Islamic, Indian, Chinese, and Japanese literary classics. Prerequisite: Junior standing. S

254. The Bible as Literature. 4 hours. Same as Engl. 254. Literary materials, origins, forms and interpretations of principal portions of the Old and New Testaments in English translation. Prerequisite: Junior standing. W

INFORMATION ENGINEERING

100. General Biology. 4 hours. Same as BioS. 100. With InfE. 101 and 102, a three-quarter sequence which may be entered in any quarter. Audio-tutorial. Principles and fundamentals of biology through examination of diverse phenomena unique to biological systems. Lecture, laboratory, and discussion.

101. General Biology. 4 hours. Same as BioS. 101. With InfE. 100 and 102, a three-quarter sequence which may be entered in any quarter. Audio-tutorial. Principles and fundamentals of biology through examination of diverse phenomena unique to biological systems. Lecture, laboratory, and discussion.

102. General Biology. 4 hours. Same as BioS. 102. With InfE. 100 and 101, a three-quarter sequence which may be entered in any quarter. Audio-tutorial. Principles and fundamentals of biology through examination of diverse phenomena unique to biological systems. Lecture, laboratory, and discussion.

120. Introduction to Electricity and Magnetism. 4 hours. Essential elements of basic electricity and magnetism as summarized by Maxwell's equations in vector integral form. Prerequisite: Math. 133.

201. History of Engineering. 4 hours. The important elements in the growth of the art and science of engineering from ancient times to the present. Lives of some of the leaders. The effect of engineering on the social conditions of the various periods. Prerequisite: Junior standing or consent of the instructor.

210. Introduction to Circuit Analysis. 5 hours. Introductory treatment of electrical network theory; equilibrium equations, exponential signals and linear differential equations, initial conditions, forced responses, node and loop methods, network theorems, power and energy. Laboratory experiments including analog computer. Prerequisites: InfE. 120 or Phys. 113 and credit or registration in Math. 220.

221. Introductory Electromagnetic Field Theory. 3 hours. Maxwell's equations in integral and differential form; static electric and magnetic fields; wave motion and introduction to radiation. Prerequisites: InfE. 120 or 229, and 240.

229. Introduction to Electromagnetic Fields. 4 hours. Elements of vector calculus; static electric and magnetic fields; elementary electromagnetic theory as summarized in Maxwell's equations in integral and differential form. Prerequisites: Phys. 113 and credit or registration in Math. 220.

240. Introduction to Electronics. 4 hours. Physical characteristics of high vacuum electron tubes, gaseous conduction and gas tubes, semi-conductors, and transistors; tube and transistor characteristics and equivalent circuits; introduction to methods of analysis. Prerequisite: InfE. 210 or the equivalent.

280. Vertebrate Morphogenesis. 5 hours. Same as BioS. 280. An introduction to vertebrate anatomy with emphasis on early embryology and histology. Lecture and laboratory. Prerequisite: One year of biological sciences.

281. Structure and Development of Vertebrates I. 5 hours. Same as BioS. 281. With InfE. 282 a two quarter sequence. Evolution of vertebrate organ systems; their embryogenesis and microscopic and gross anatomy. Lecture and laboratory. Prerequisite: InfE. 280.

282. Structure and Development of Vertebrates II. 5 hours. Same as BioS. 282. Continues InfE. 281. Prerequisite: InfE. 281.

283. **General Genetics. 5 hours.** Same as BioS. 240. Principles of heredity and variation illustrating the gene concept. Examples include animal, plant, microorganism, and human heredity. Lecture and laboratory. Prerequisite: One year of biological sciences. Math. 104, 105, 130, and organic chemistry are recommended.

284. **Cellular Biodynamics. 5 hours.** Same as BioS. 261. The basic physiological activities common to cells; study of the functions characteristic of specialized cell types. Lecture and laboratory. Prerequisite: One year of biological sciences.

310. **Signal Processing. 4 hours.** Exponential excitations and responses; signal representation in terms of Fourier series, Fourier transforms, bilateral and unilateral Laplace transforms; applications. Prerequisites: InfE. 210 and 240 or consent of the instructor.

311. **Linear Systems Analysis. 4 hours.** Application of signal representations discussed in InfE. 310 to the analysis of linear systems; transform methods and frequency analysis; natural response, stability; signal flow graphs; LaPlace transform with two variables; convolution integral and applications. Prerequisite: InfE. 310.

312. **Introduction to Communication Engineering. 4 hours.** Introduction to communication systems; amplitude, frequency, and pulse-type modulation; correlation and correlation functions; noise and noise calculations; channel capacity and bandwidth-signal to noise ratio applications. Prerequisite: InfE. 311 and 340.

315. **Intermediate Network Analysis. 4 hours.** An intermediate course in network analysis. LaPlace transform analysis of networks; impedance and admittance functions, network theorems; network functions; one and two port networks. Individual projects are required. Prerequisite: InfE. 311.

316. **Introduction to Network Synthesis. 4 hours.** Continues InfE. 315, covering positive real functions, L-C synthesis, RC, RL, and RLC synthesis, and filter design. Individual projects are required. Prerequisite: InfE. 315.

320. **Introductory Wave Propagation and Transmission. 5 hours.** Transmission line theory and introduction to wave guides; elementary antenna theory. Prerequisite: InfE. 221.

324. **Wave Propagation and Radiation I. 4 hours.** Maxwell's equations and electromagnetic waves. Analysis of wave propagation in rectangular and circular waveguides. Reduction of waveguide discontinuity problems to equivalent network problems. Prerequisites: InfE. 311 and 320.

325. **Wave Propagation and Radiation II. 4 hours.** Antennas and radiating systems. Radiation from a quarter-wave monopole or half-wave dipole. Antenna impedance. Directional characteristics of antennas. Antenna practice and design. Prerequisite: InfE. 324.

326. **Wave Propagation and Radiation III. 4 hours.** Motion of charged particles in fields. Principles of klystrons, magnetrons, and traveling wave tubes. Introduction to solid state parametric devices. Prerequisite: InfE. 325.

330. Communication Theory I. 4 hours. With InfE. 331, an introduction to statistical communication theory. Signal spectra, modulation, noise, probability theory; applications of statistics to communication systems. Prerequisite: InfE. 312.

331. Communication Theory II. 4 hours. Continues InfE. 330. Individual projects are required. Prerequisite: InfE. 330.

340. Intermediate Electronics. 4 hours. Continues InfE. 240. Applications of tubes, transistors, and semiconductor diodes, along with practical laboratory experience. Prerequisite: InfE. 240.

342. Solid State Electronics. 4 hours. Semiconductor physics and semiconductor circuits. Physics and circuit properties of transistors, semiconductor diodes, and other semiconductor devices, along with practical laboratory experience. Prerequisite: InfE. 340.

344. Electronic Applications I. 4 hours. InfE. 345, a discussion of devices and circuits involved in pulse, digital, and switching wave-forms. Prerequisite: InfE. 342.

345. Electronic Applications II. 4 hours. Continues InfE. 344. Prerequisite: InfE. 344.

352. Biocontrol. 3 hours. Demonstration of the applicability of control systems theory to physiological systems including the pupil system, eye and hand movement systems, and utilizing techniques such as Fourier analysis, Nyquist stability criteria, and cross-correlation. Prerequisites: InfE. 310 and 311 or consent of the instructor.

353. Biocontrol Laboratory. 3 hours. Experimental counterpart of InfE. 352. Motor coordination, crayfish photoreceptor, human pupil, eye movement. Prerequisites: InfE. 310, 311, and credit or registration in InfE. 352.

359. Neuroanatomy. 3 hours. An introduction to the anatomy of the central nervous system using a programmed text and supplementary material in the form of visual aids and outside readings. Prerequisite: One year of biological sciences or consent of the instructor.

360. Automatic Control Theory I. 4 hours. Introduction to linear feedback control theory. LaPlace transform solution of linear differential equations, transfer functions, pole-zero configurations, response from pole-zero plots, and signal flow graph techniques. Prerequisite: InfE. 311.

361. Automatic Control Theory II. 4 hours. Continues InfE. 360. Additional topics include stability and frequency response, design procedures using frequency response, compensation techniques, and introduction to state variable methods. Prerequisite: InfE. 360.

371. Computer Systems I. 4 hours. Predicates, propositions, and computability, using the Turing machine as a model. Recursive functions. Individual projects are required. Prerequisites: Math. 195 and 310.

372. **Computer Systems II. 3 hours.** Automata theory. Machine equivalence and state assignment. Partitions and pair algebra. Semigroups and machines. Individual projects are required. Prerequisite: InfE. 371.

373. **Computer Systems III. 3 hours.** Numerical aspects of computer structure; concepts of efficiency of number system, and the like; nonnumerical aspects; linguistics-grammar and syntax; finite state grammar as finite automata. Individual projects are required. Prerequisite: InfE. 372.

383. **Animal Physiology I. 5 hours.** Same as BioS. 363. The role of the digestive, circulatory, respiratory, and osmoexcretory systems in the maintenance of organismic homeostasis. Emphasis on vertebrates. Lecture and laboratory. Prerequisite: InfE. 284.

384. **Animal Physiology II. 5 hours.** Same as BioS. 364. The role of the muscular, sensory, nervous, and endocrine systems in the maintenance of organismic integration. Emphasis on vertebrates. Lecture and laboratory. Prerequisite: InfE. 284.

391. **Seminar. 1 to 4 hours.** Topics to be arranged. Prerequisite: Consent of the instructor.

392. **Undergraduate Research. 2 to 4 hours.** Research under the close supervision of a faculty member. Prerequisite: Consent of the instructor.

393. **Special Problems. 2 to 4 hours.** Special problems or reading by special arrangement with the faculty. Prerequisite: Consent of the instructor.

ITALIAN

101. **Elementary Italian. 4 hours.** For students without credit in Italian. *Note*: A student must have credit in Ital. 101, 102, and 103 to receive graduation credit in 101. Oral practice, reading, and grammar. Two additional half hours per week in the language laboratory.

102. **Elementary Italian. 4 hours.** *Note*: A student must have credit in Ital. 102 and 103 to receive graduation credit in 102. Continues Ital. 101. Two additional half hours per week in the language laboratory. Prerequisite: Ital. 101 or the equivalent.

103. **Elementary Italian. 4 hours.** Continues Ital. 102. Two additional half hours per week in the language laboratory. Prerequisite: Ital. 102 or the equivalent.

LANGUAGE LABORATORY

150. **For students taking any 101 foreign language course.** Intensive oral-aural practice. Two to six half hours per week.

151. **For students taking any foreign language course beyond the 101 level** which re-

quires the use of the Language Laboratory. Intensive oral-aural practice. Two to six half hours per week.

LATIN

101. Elementary Latin I. 4 hours. *Note*: A student must have credit in Lat. 101, 102, and 103 to receive graduation credit in 101. For students who have no credit in Latin. Grammar and reading. One additional half hour per week in the language laboratory. **F**

102. Elementary Latin II. 4 hours. *Note*: A student must have credit in Lat. 102 and 103 to receive graduation credit in 102. Continues Lat. 101. Grammar and reading of easy prose and poetry. One additional half hour per week in the language laboratory. Prerequisite: Lat. 101 or the equivalent. **W**

103. Elementary Latin III. 4 hours. Review of grammar; reading of prose. One additional half hour per week in the language laboratory. Prerequisite: Lat. 102 or two years of high school Latin. **S**

104. Intermediate Latin I. 4 hours. Selected readings in prose and poetry. Review of forms and grammar. One additional half hour per week in the language laboratory. Prerequisite: Lat. 103 or two years of high school Latin. **F**

105. Intermediate Latin II. 4 hours. Continues Lat. 104. One additional half hour per week in the language laboratory. Prerequisite: Lat. 104 or the equivalent. **W**

106. Intermediate Latin III. 4 hours. Continues Lat. 105. One additional half hour per week in the language laboratory. Placement by proficiency examination. Prerequisite: Lat. 105 or the equivalent. **S**

109. Honors Course I. 4 hours. *Note:* A student must have credit in Lat. 110 and 111 to receive credit in 109. Rapid reading of Latin prose. Prerequisite: Three or four years of high school Latin with a B average or better or Lat. 106 or advanced placement by examination or consent of the instructor.

110. Honors Course II. 4 hours. *Note*: A student must have credit in Lat. 109 and 111 to receive credit in 110. Rapid reading of Latin poetry. Prerequisite: Three or four years of high school Latin with a B average or better or Lat. 109 or advanced placement by examination or consent of the instructor.

111. Honors Course III. 4 hours. *Note*: A student must have credit in Lat. 109 and 110 to receive credit in 111. Rapid reading of Latin prose and poetry. Prerequisite: Three or four years of high school Latin with a B average or better or Lat. 110 or advanced placement by examination or consent of the instructor. Individual assignments at the discretion of the instructor.

201. Survey of Latin Literature I. 4 hours. *Note*: A student must have credit in Lat. 202 and 203 to receive credit in 201. Writings of the early period. Prerequisite: Lat. 111, or four years of high school Latin.

202. **Survey of Latin Literature II. 4 hours.** *Note*: A student must have credit in Lat. 201 and 203 to receive credit in 202. Writings of the middle period. Prerequisite: Lat. 201.

203. **Survey of Latin Literature III. 4 hours.** *Note*: A student must have credit in Lat. 201 and 202 to receive credit in 203. Writings of the late period. Prerequisites: Lat. 201 and 202.

204. **Catullus:** *Carmina.* **4 hours.** All the poems of Catullus, with special attention to the lyrics. Prerequisite: Lat. 106 or the equivalent. **F**

205. **Pliny the Younger:** *Epistulae.* **4 hours.** Selections from the correspondence. Prerequisite: Lat. 106 or the equivalent. **F**

206. **Cicero: Philosophic Essays. 4 hours.** Selections from one or more of Cicero's philosophic writings—*De Amicitia, De Senectute, De Officiis, Tusculanae Quaestiones.* Prerequisite: Lat. 106 or the equivalent. **W**

207. **Terence:** *Fabulae.* **4 hours.** Selections from two or more plays. Prerequisite: Lat. 106 or the equivalent. **S**

211. **Fundamentals of Latin Prose Composition. 2 hours.** May be repeated for a maximum of 6 hours. Review of grammar and forms; extensive translation from English to Latin; stress on the relationship of style to diction. Primarily for students majoring in Latin. **W, S, F**

250. **Ovid:** *Metamorphoses,* **Selections. 4 hours.** Reading and translation of selected books and myths from the *Metamorphoses.* Prerequisite: Lat. 106 or the equivalent. **W**

251. **Juvenal:** *Saturae.* **4 hours.** Selections from the sixteen extant satires. Prerequisite: Lat. 106 or the equivalent.

252. **Livy:** *Ab urbe condita,* **Selections. 4 hours.** Reading and translation of selected books from Livy's *History of Rome.* Prerequisite: Lat. 106 or the equivalent. **S**

299. **Independent Reading. 4 hours.** Individual study under faculty direction. For students qualified by preparation and interest. Prerequisite: Lat. 201 or the equivalent. **S**

301. ***Corpus Caesarianum.* 4 hours.** For secondary school teachers of Latin and prospective teachers. Rapid reading of Latin prose, based on the *Corpus Caesarianum,* with discussion of the social and political aspects which contribute to understanding of the texts read. Prerequisite: Senior standing in Latin or consent of the instructor or admission to the graduate program.

302. **Vergil. 4 hours.** Books 1 to 12 of the *Aeneid.* Rapid reading of Latin epic poetry; discussion of meter, diction, mythology, literary tradition, and historical background of the poem. Prerequisite: Senior standing in Latin or consent of the instructor or admission to the graduate program.

MANAGEMENT

150. Business and Society I. 4 hours. Open to freshmen only. The nature and development of business. Business and its environments: economic, social, cultural, political, and technological; historical view of the impact of business on society and the influence of society on business; philosophy of management. Prerequisite: Enrollment in the College of Business Administration.

151. Business and Society II. 4 hours. Open to freshmen only. The nature and development of business. Business and its environments: economic, social, cultural, political, and technological; historical view of the impact of business on society and the influence of society on business; philosophy of management. Prerequisite: Enrollment in the College of Business Administration.

152. Business and Society III. 3 hours. Open to freshmen only. The nature and development of business. Business and its environments: economic, social, cultural, political, and technological; historical view of the impact of business on society and the influence of society on business; philosophy of management. Prerequisite: Enrollment in the College of Business Administration.

350. Organization and Administration. 4 hours. Theories of management; concepts of organization; major functions of management; fundamentals of decision making. Emphasis on the role of management and administration within the business firm. Prerequisite: Junior standing.

351. Organization Theory. 4 hours. Important theories of organization: their foundation, application, and consequences in the attainment of individual and organization objectives. Emphasis on formal and informal aspects of organization, authority relationships, and structural aspects. Prerequisite: Mgmt. 350.

352. Administrative Practices. 4 hours. An examination of executive and manager behavior in working organizations. Analysis of human problems and relationships at work. Leadership styles, problems of motivation and attitudes. Emphasis on behavioral science theory and technology. Case method of analysis and study. Prerequisite: Mgmt. 351.

353. Personnel Management. 4 hours. The foundation, history, and objectives of manpower management; motivation and supervision; selection, training, and discipline; union-management relations; wage-and-salary administration; personnel research. Prerequisite: Mgmt. 351.

354. Industrial Relations Systems. 4 hours. Analysis of labor unions and their impact on business firms and society. Types of labor-management relationships and collective bargaining practices. Examination of public policy, union structure, and bargaining theory. Prerequisite: Mgmt. 353.

356. Operations and Systems Management I. 4 hours. Application of management science and modern techniques of analysis to production problems. Emphasis on systems and operations management to production programs, quality control, facilities design, production flow, and cost control. Analysis of computer contribu-

tions to decision-making and problem solving. Prerequisites: Mgmt. 351; Math. 110, 111, 112; QM 170, 171, 172.

357. Operations and Systems Management II. 4 hours. Emerging concepts in management science. Managerial applications of computer technology and utilization and related electronic data processing. Application of quantitative methods to information and control methods and systems. Process and systems design. Prerequisite: Mgmt. 356.

359. Business Policy. 4 hours. A capstone course which provides the student with an understanding of the direction of business operations from the top-management point of view rather than from the limited view of a particular functional-area specialist. By means of class discussion, written analysis of cases, and development of feasible plans of action, the student gains experience in determining problem areas in company planning and management and in dealing successfully with a constantly changing business environment. Prerequisites: Senior standing and completion of core requirements of the College of Business Administration.

MARKETING

360. Principles of Marketing. 4 hours. Theory and practice in the formulation of marketing decisions; planning, pricing, and promotion; distribution of goods and services to all types of consumers. Prerequisite: Junior standing.

361. Consumer Market Behavior. 4 hours. Motivations underlying market behavior of consumers, producers, middlemen; drives, emotions, desires, learning, memory; effects of demographic characteristics, social status, and reference groups on marketing action. Prerequisites: Mktg. 360 and consent of the instructor.

362. Marketing Research. 4 hours. An investigation of the gathering and interpretation of information used in solving marketing problems; pertinent modern research techniques from mathematics and the behavioral sciences are employed in developing an analytical structure. Prerequisites: Mktg. 361 and QM 172 or the equivalent.

363. Marketing Organization. 4 hours. Principles underlying the development of an integrated distribution system; its relationship to the marketing structure of the firm; evaluation of decisions on raw-material sources, plant and warehouse location, wholesale and retail outlets; analysis of the movement of products through marketing channels. Prerequisite: Consent of the instructor.

364. Managing Marketing Communications. 4 hours. Analysis of communication information among producers, middlemen, and consumers for marketing purposes; managerial problems in directing a firm's promotional efforts; personal selling, advertising, sales promotion, public relations. Prerequisite: Consent of the instructor.

365. Marketing Management. 4 hours. Seminar. Building marketing programs to implement the achievement of marketing objectives. Individual and group research

and presentation from the viewpoint of major marketing executives of the firm; business case analysis. Prerequisite: Mktg. 364 or consent of the instructor.

MATERIALS ENGINEERING

101. Engineering Mechanics I. 3 hours. Statics of particles and rigid bodies. Kinematics and dynamics of particles. Work and energy, impulse and momentum. Principles of vibration analysis. Prerequisites: MatE. 111, Math. 132, or the equivalent.

102. Engineering Mechanics II. 3 hours. Kinematics and kinetics of rigid bodies, energy and momentum methods. Mechanical vibrations of rigid bodies. Prerequisite: MatE. 101.

103. Engineering Mechanics III. 3 hours. Analysis of stress and strain, principal stresses and strains. Constitutive laws of elastic and selected types of inelastic materials. Strain energy and failure criteria. Simple problems of stress and deformation analysis. Prerequisites: MatE. 111, Math. 133 or the equivalent.

104. Engineering Mechanics I. 4 hours. Statics of particles and rigid bodies. Kinematics and dynamics of particles. Work and energy, impulse and momentum. Principles of vibration analysis. Prerequisites: Math. 132 and SysE. 153.

105. Engineering Mechanics II. 4 hours. Kinematics and kinetics of rigid bodies, energy, and momentum methods. Mechanical vibrations of rigid bodies. Prerequisite: MatE. 104.

106. Engineering Mechanics III. 4 hours. Analysis of stress and strain, principal stresses and strains. Constitutive laws of elastic and selected types of inelastic materials. Strain energy and failure criteria. Simple problems of stress and deformation analysis. Prerequisite: MatE. 105.

111. Engineering Statics. 3 hours. Resultants of force systems, algebraic and graphical condition of equilibrium for force systems; moment diagrams, virtual work, forces due to friction; centroids. Prerequisite: Math. 130.

142. Properties of Materials I. 4 hours. Introduction to the atomic, molecular, crystalline, and microstructural nature of metals, ceramics, and plastics. Equilibrium phase relationships. Dependence of mechanical and physical properties on microstructure. Prerequisites: Math. 131, high school credit in chemistry or the equivalent.

202. Soil Behavior. 4 hours. Engineering properties of soil. Origin of soil deposits; mineral composition of soils. Soil as a three phase system; effective and neutral stresses; effective stress principle. Soil water: permeability and capillarity; frost heaving. Lectures and laboratory. Prerequisite: MatE. 103.

203. Composition and Properties of Concrete. 3 hours. Properties and functions of the constituents; physical and chemical structure and hydration; strength and deformation characteristics of hardened concrete; relations between microproperties and macroproperties. Prerequisites: MatE. 103 and 142.

204. Mechanics of Solids I. 4 hours. The basic relations governing the behavior of an elastic body and simple exact solutions. Engineering approximations: bending, torsion, buckling. Prerequisites: MatE. 103 and Math. 133.

205. Mechanics of Solids II. 4 hours. Structural energy principles: virtual work, potential energy, complementary energy, reciprocity. Application to beams, frames, trusses, and the like. Prerequisite: MatE. 204.

206. Mechanics of Solids III. 4 hours. The plane problem of elasticity and simple solutions in Cartesian and polar coordinates. Engineering approximations: thin-walled pressure vessels, torsion of thin-walled sections, beams on elastic foundations. Prerequisite: MatE. 204.

207. Structural Analysis I. 4 hours. Analysis of statically determinate problems. Application of energy methods to statically indeterminate problems. Beam-columns and beams on elastic foundation. Influence lines. Prerequisite: MatE. 205.

208. Mechanical Vibrations. 4 hours. Free and forced vibrations of damped and undamped linear single and multiple degree-of-freedom systems. Introduction to nonlinear system vibration. Approximate methods, instrumentation, and applications. Prerequisites: MatE. 102 and Math. 220 or the equivalents.

209. Analysis and Synthesis of Mechanisms. 4 hours. Analytical and graphical analysis of plane and spatial motion. Geometrical and algebraic synthesis of mechanisms. Computer methods, applications. Prerequisite: MatE. 102.

210. Experimental Soil Mechanics. 3 hours. Experimental techniques for determining soil properties. Identification and classification tests. Consolidation tests with pore pressure measurements. Permeability and capillarity tests of saturated and partly saturated soils. Soil compaction techniques. Introduction to measurements of shear strength. Prerequisite: MatE. 103.

221. Behavior and Design of Metal Structures I. 3 hours. Design of metal structures; behavior of members and their connections; theoretical, experimental, and practical bases for proportioning members. Prerequisite: MatE. 205.

225. Design of Concrete Structures. 4 hours. Analysis and design of concrete structural elements: beams, columns, slabs, and the like. Prestressed concrete design. Prerequisite: MatE. 203.

226. Foundation Engineering. 3 hours. Effect of subsurface soil conditions on choice of foundation. Subsurface soil exploration. Types of foundations: spread footings; mats, pile foundations. Proportioning foundations for settlement and bearing capacity. Design of retaining structures: retaining walls, bulkheads, bracing of excavations. Design of embankments and earth dams for stable slopes. Construction procedures. Prerequisite. MatE. 202.

230. Properties of Materials II. 4 hours. Effects of deformation and thermal treatments upon microstructure and properties. Heat treatment of precipitation and transformation hardenable materials. Corrosion and surface reactions. Prerequisite: MatE. 142.

239. X-Ray Metallography I. 3 hours. Part I of a two-course sequence. X-ray generation and scattering. Applications of methods of X-ray diffraction to studies of crystallography and problems in physical metallurgy, such as phase identification, lattice parameter determination, grain size determination, preferred orientation, surface topography and residual stress determination. Prerequisite: MatE. 230.

241. Materials Processing I. 4 hours. Principles of metalworking and powder metallurgy. Principles and practices. Process control problems. Relation between structure and properties. Prerequisite: MatE. 230.

242. Materials Processing Laboratory I. 1 hour. Measurement of flow stress in compression, friction and lubrication effects. Synthesis of metalworking defects in rolling, drawing, extrusion, and powder metallurgy. Prerequisite: Credit or registration in MatE. 241.

243. Metallurgical Problems. 3 hours. Theory and application of the laws of thermodynamics to metallic systems; problems concerning industrial and metallurgical processes. Prerequisite: EnrE. 201.

244. Materials Processing II. 4 hours. Principles and practices of casting and joining processes. Freezing of metals. Casting and welding processes. Properties of mold materials. Comparative costs. Diffusion bonding, brazing, soldering, and adhesive bonding, metal-non-metal bonding. Prerequisites: MatE. 230.

245. Materials Processing Laboratory II. 1 hour. Experimental melting, casting, mold preparation, analysis of defects in sand, permanent mold, investment and shell castings, mold control, pattern design. Prerequisite: Credit or registration in MatE. 244.

246. Numerical Control Processing. 3 hours. Application of data processing to machine control, machine and tooling requirements. Computer utilization. Machine language. Machining techniques and control methods for efficient use of numerical control. Prerequisites: Junior standing and Math. 195.

247. Manufacturing Cost Analysis. 3 hours. Techniques of economic analysis of mechanical processes, mechanical process planning, estimating, value engineering, inspection and quality standards, direct and indirect costs, amortization of capital expenditures, useful life of equipment, depreciation, salvage values. Prerequisites: MatE. 241, 244, and 249.

248. Materials Processing III. 4 hours. Principles and practices of steelmaking and selected topics in ferrous physical metallurgy including martensite transformation, eutectoid decomposition, maraging and ausforming. Hardenability and temperability. Prerequisite: MatE. 230.

249. Materials Processing IV. 4 hours. Mechanics of metal cutting. Application of metal removal principles in machining. Analysis and optimizing of metal cutting variables by use of computers. Tool and machine requirements in metal removal processes. Problems in plastic machining. Ceramic removal processes. Prerequisite: Credit or concurrent registration in MatE. 241.

250. Physical Metallurgy I. 3 hours. Part I of a three-course sequence. Principles and interpretation of phase diagrams; relationships between structure, thermal history, and properties. Prerequisite: MatE. 230.

251. Physical Metallurgy II. 3 hours. Part II of a three-course sequence. Fundamental treatment of mechanical properties. Elastic behavior. Plastic behavior of single crystals. Elements of dislocation theory. Plastic behavior of polycrystalline aggregates. Fracture. Prerequisite: MatE. 250.

252. Physical Metallurgy III. 3 hours. Part III of a three-course sequence. Diffusion, nucleation. Transformation kinetics. Creep and rupture. Oxidation and corrosion. Alloys of iron and carbon. Prerequisite: MatE. 251.

253. Physical Metallurgy Laboratory I. 1 hour. Part I of a three-course sequence. Demonstration of the principles of solidification, cold working, annealing, and heat treatment of metals. Study of microstructures of simple binary alloys. Principles and techniques of metallography and photomicrography, analysis and interpretation of microstructures. Prerequisite: Registration in MatE. 250.

254. Physical Metallurgy Laboratory II. 1 hour. Part II of a three-course sequence. Demonstration of the principles of solidification, cold working, annealing, and heat treatment of metals. Study of microstructures of simple binary alloys. Principles and techniques of metallography and photomicrography, analysis and interpretation of microstructures. Prerequisite: Registration in MatE. 251.

255. Physical Metallurgy Laboratory III. 1 hour. Part III of a three-course sequence. Demonstration of the principles of solidification, cold working, annealing, and heat treatment of metals. Study of microstructures of simple binary alloys. Principles and techniques of metallography and photomicrography, analysis and interpretation of microstructures. Prerequisite: Registration in MatE. 252.

301. Introduction to the Mechanics of Continua. 4 hours. Vectors and tensors and their component properties in Cartesian coordinates. The displacement and velocity vectors, the stress and strain tensors and their time rates. Isotropic and deviatoric components. Equations of equilibrium and of compatibility. Constitutive relations for linear elastic and viscous bodies and generalized linear viscoelastic behavior. Isotropy. Introduction to perfect plasticity. Sample problems for all cases by means of simple one-dimensional models. Prerequisite: MatE. 103, Math. 220, or consent of the instructor.

302. Applied Elasticity I. 4 hours. Variational theorems of elasticity theory. Application to establishment and solution of approximate systems: beams (including shear deformations) and plates. Introduction to instability theory. Prerequisite: MatE. 205 or 206.

303. Theory of Elasticity I. 4 hours. The boundary value problems of linear isotropic elasticity theory. Uniqueness of solution. Reduction to two dimensions: the plane problem, torsion, bending. General orthogonal coordinates and special application to polar coordinates. Three-dimensional problems with axial symmetry. Prerequisite: MatE. 301.

304. **Experimental Stress Analysis. 4 hours.** Structural similitude and dimensional analysis. Brittle coating. Introduction to photoelasticity. Strain measurement techniques. Prerequisite: MatE. 206.

311. **Intermediate Dynamics. 4 hours.** Kinematics of a point, space curves. Particle dynamics, orbital motion and stability. Moving reference frames. Rigid body dynamics: the inertia tensor, Euler's equations, application to gyroscopic motion. Hamilton's principle. Generalized coordinates, Lagrange's equations. Prerequisite: MatE. 102, Math. 220, or consent of the instructor.

312. **Nonlinear Oscillations. 4 hours.** Exact and approximate methods of studying vibrations of nonlinear systems. Analytical and graphical techniques. Forced oscillations, self-excited systems, stability criteria. Computer methods. Practical applications. Prerequisite: MatE. 208.

313. **Applied Dynamics. 4 hours.** Application of principles of dynamics to engineering physics. Balancing; rolling and sliding contact, static and dynamic force analyses of machine elements. Critical speeds. Impacting loading. Prerequisites: MatE. 208, 209, or consent of the instructor.

321. **Structural Analysis II. 4 hours.** Establishment of basic equations governing linear structural systems. Matrix inversion and relaxation solutions. Approximate analyses. Introduction to dynamics of structures. Prerequisite: MatE. 207.

322. **Concrete Technology I. 4 hours.** Relations between microproperties and macroproperties; mechanisms of fracture, creep and shrinkage; statistical aspects; air entrainment; special types of concrete. Individual research project involving laboratory and analytic techniques. Prerequisite: MatE. 203 or the equivalent.

324. **Limit Analysis and Design of Structures. 4 hours.** Boundedness principles of perfect plasticity. Application to analysis and design of structures. Prerequisite: MatE. 207.

331. **Electron Theory of Metals. 3 hours.** Modern physical concepts of metals and alloys. Introduction to wave mechanics. Thermal, electrical, and magnetic properties of metals. Band theory of metals. Prerequisite: MatE. 252.

332. **Advanced Diffraction Analysis. 3 hours.** Single crystal methods in X-ray diffraction, orientation determination, pole figures, structure determination, precision lattice constant methods. Prerequisite: MatE. 239 or the equivalent.

333. **Design Use of Materials. 4 hours.** Methods of measurement and significance of tests for service properties. Selection of materials for specific applications. Case histories. Prerequisite: MatE. 230.

334. **Metallurgy of Nuclear Materials. 3 hours.** Uses of materials for the production of nuclear energy, environmental problems associated with radiation damage, mechanical and physical property changes, swelling, poisoning, fission, moderation, neutron capture, and latent activity. Prerequisites: Phys. 114 and MatE. 252.

335. **Electron Microscopy. 3 hours.** The electron microscope and its application to the study of surface replicas and thin films of metals, alloys, and other materials. Sources of contrast. Selected area diffraction. Prerequisites: MatE. 239 and 252.

341. **Theoretical Soil Mechanics I. 3 hours.** Theories used in soil mechanics. Derivation of theoretical relationships and theoretical implications of empirical laws. Theories of deformation of soil systems; states of stress and deformation in soil masses; one-dimensional theory of consolidation for homogeneous and nonhomogeneous clay layers; seepage as a function of isotropy and homogeneity. Prerequisite: MatE. 202 or the equivalent.

381. **Design Project in Structural Mechanics. 4 hours.** Analytical or experimental design project in structural mechanics. Prerequisite: Senior standing.

382. **Design Project in Mechanical Analysis and Design. 4 hours.** Analytical or experimental design project in mechanical design. Prerequisite: MatE. 206, 313, or consent of the instructor.

391. **Seminar. 1 hour.** Topics to be arranged. Prerequisite: Consent of the instructor.

392. **Undergraduate Research. 2 to 4 hours.** Research under the close supervision of a faculty member. Prerequisite: Consent of the instructor.

393. **Special Problems. 2 to 4 hours.** Special problems or reading by special arrangement with the faculty. Prerequisite: Consent of the instructor.

MATHEMATICS

100. **Algebra and Trigonometry I. 5 hours.** Credit is not given for Math. 100 if the student has credit in 104. Fundamentals of algebra, factoring, fractions, radicals, exponents, solutions of equations, complex numbers, logarithms, progressions. Prerequisites: 1 unit of entrance credit in algebra and 1 unit in plane geometry. W, S, Su

101. **Algebra and Trigonometry II. 5 hours.** Credit is not given for Math. 101 if the student has credit in 104 and/or 105. Mathematical induction, binomial theorem, inequalities, theory of equations, determinants, permutations and combinations, trigonometric functions, identities, equations, graphs. Prequisite: Math. 100. W, S, Su

104. **College Algebra. 5 hours.** Credit is not given for Math. 104 if the student has credit in 100. Theory of equations, systems of equations, determinants, complex numbers, permutations and combinations, mathematical induction, binomial theorem, progressions, inequalities, logarithms. Prerequisites: 1½ units of entrance credit in algebra and 1 unit in plane geometry. W, S, Su

105. **Trigonometry. 3 hours.** Credit is not given for Math. 105 if the student has credit in 101. Restricted to students who have not had a formal course in trigonometry. Identities, equations, addition formulas and derived relations, solution

of triangles, radian measure, graphs, inverse functions. Prerequisites: 1½ units of entrance credit in algebra and 1 unit in plane geometry. W, S, Su

106. Mathematics for Elementary Teachers I. 4 hours. A course designed to prepare students to teach contemporary mathematics programs in the elementary schools. Prerequisite: Enrollment in the College of Education.

107. Mathematics for Elementary Teachers II. 4 hours. Prerequisite: Math. 106. W

108. Mathematics for Elementary Teachers III. 4 hours. Continues Math. 107. Prerequisite: Math. 107. S

110. Finite Mathematics. 5 hours. Statements and logic, sets, Boolean algebra, probability, vectors and matrices, linear programming, theory of games. Prerequisite: Math. 101 or 104 or the equivalent. W, S, Su

111. Introduction to Analysis I. 3 hours. For students in Business Administration or Architecture; others by consent of the department. Introduction to differential and integral calculus, together with sufficient material from analytic geometry to assist in the development and application of the calculus. Prerequisite: Math. 101 or 104 or the equivalent. W, S, Su

112. Introduction to Analysis II. 3 hours. For students in Business Administration or Architecture; others by consent of the department. Continues Math. 111. Prerequisite: Math. 111. W, S, Su

115. Fundamentals of Mathematics I. 4 hours. Survey course in mathematics: numbers and numerals, algebra, progressions, number theory. Prerequisites: 1 unit of entrance credit in algebra and 1 unit in plane geometry. W, S, Su

116. Fundamentals of Mathematics II. 4 hours. Survey course in mathematics: axioms of euclidean geometry, symmetry, perspective, Cartesian geometry, conic sections, noneuclidean geometry. Prerequisite: Math. 115 or consent of the instructor. W, S, Su

117. Fundamentals of Mathematics III. 4 hours. Survey course in mathematics: sets and logic, infinity, probability, statistics, calculus, computing machines. Prerequisite: Math. 116. W, S, Su

130. Analytic Geometry. 5 hours. Real numbers, sets, functions, graphs, lines, conic sections, parametric equations, polar coordinates, analytic geometry of three dimensions. Prerequisite: Math. 101, or 104 and 105, or the equivalent. W, S, Su

131. Calculus I. 5 hours. Introductory concepts of calculus: limits, continuity, derivatives, techniques of differentiation, applications of derivatives, antiderivatives, the definite integral. Prerequisite: Math. 130. W, S, Su

132. Calculus II. 5 hours. Integration formulas, sequences and Riemann sums and applications, the number *e*, circular and hyperbolic functions and their inverses, partial derivatives, mean value theorems, indeterminate forms. Prerequisite: Math. 131. W, S, Su

133. Calculus III. 5 hours. Infinite series, Taylor formula and Taylor series, functions of several variables, multiple integrals, line and surface integrals. Prerequisite: Math. 132. W, S, Su

180. Introduction to College Algebra. No credit. Restricted to students participating in Experimental Program in Urban Education. Basic processes in solving arithmetic and algebraic problems. Prerequisite: Consent of the instructor. W, S

194. Introduction to Automatic Digital Computing for Nontechnical Studies. 3 hours. Credit is not given for Math. 194 if the student has credit in 195. Restricted to students not in mathematics, physics, engineering, or related curricula. Topics in problem formulation, logical statement of problems, automatic programming, applications to computers. The IBM 1620 is used. Prerequisite: Sophomore standing or consent of the instructor. W, S, Su

195. Introduction to Automatic Digital Computing. 3 hours. Credit is not given for Math. 195 if the student has credit in 194. Topics in machine organization, problem formulation, automatic programming, numerical analysis, machine language programming, and application. The IBM 1620 is used for solving problems. Prerequisite: Math. 132. W, S, Su

220. Elementary Differential Equations I. 3 hours. Systematic procedures for solving ordinary differential equations; emphasis on initial value problems of second order linear equations. Series solutions near ordinary and singular points. Introduction to the Laplace transform and numerical methods. Prerequisite: Math. 133. W, S, Su

250. Statistics for Engineers. 5 hours. A first course in the use of statistical methods for interpreting the results of experiments. Probability and distributions, expectation, sampling and testing, estimation problems, chi square tests, T and F tests, regression and correlation. Prerequisite: Math. 133. W, S

290. Introduction to the Theory of Digital Machines. 3 hours. The general organization of computers, number systems, Boolean algebra, design of combinational circuits, and sequencing of arithmetic operations. Prerequisite: Math. 195. W, S

300. Teachers Course I. 3 hours. Fundamental concepts of mathematics and their place in the school curriculum. Topics, discussed from an advanced viewpoint, include variables, sets, relations, functions, logic, and proof. Prerequisite: Math. 133 or consent of the instructor. S

301. Teachers Course II. 3 hours. Continues Math. 300. Topics, discussed from an advanced viewpoint, include mathematical induction, the completeness axiom, composition of functions, sequences, a vector approach to geometry, axioms of the Hilbert type. Prerequisite: Math. 300 or consent of the instructor. W, Su

302. Teachers Course III. 3 hours. Continues Math. 301. Topics, discussed from an advanced viewpoint, include arithmetic and geometric progressions, continued sums and products, difference sequences, pigeon-hole principle, limits, continuity, exponential functions, logarithmic functions, circular functions, combinations and permutations. Prerequisite: Math. 301 or consent of the instructor. S

303. Advanced Euclidean Geometry I. 3 hours. Geometry from Euclid to the present, equivalents of Euclid's fifth postulate, noneuclidean geometries, finite and projective geometries, invariants of configurations under transformation. Prerequisite: Math. 133. S

304. Advanced Euclidean Geometry II. 3 hours. The parallel postulate, similarity, area perpendicularity, circles and spheres, constructions with ruler and compass. Prerequisite: Math. 303. W, Su

305. Advanced Euclidean Geometry III. 3 hours. Ruler and compass constructions, proportionality, length and area, solid mensuration, hyperbolic geometry. Prerequisite: Math. 304. S

306. Seminar in Mathematics for Teachers. 3 hours. May be repeated for a total of 9 hours. Advanced topics and special problems in the teaching of precollege mathematics. Prerequisite: Math. 302.

307. Theory of Sets and the Real Number System. 5 hours. The elementary set theory and the development of the integers, the rational numbers, and the real numbers. Prerequisite: Math. 133. W, S, Su

310. Higher Analysis I. 4 hours. The number system, functions, sequences and limits, continuity and differentiability, integration, the elementary transcendental functions, continuity, properties of differentiable functions. Individual projects are assigned. Prerequisite: Math. 133. W, S, Su

311. Higher Analysis II. 3 hours. Vectors, functions of several variables, limits and continuity, differentiable functions, transformations and implicit functions, extreme values, multiple integrals, line and surface integrals. Prerequisite: Math. 310. W, S, Su

312. Higher Analysis III. 3 hours. Infinite series, sequences and series of functions, uniform convergence, Taylor series, improper integrals, integral representation of functions, Fourier series. Prerequisite: Math. 311. W, S, Su

321. Elementary Differential Equations II. 3 hours. Systems of linear first order equations. Boundary value problems for second order linear equations, and introduction to partial differential equations. Nonlinear problems described by one or two differential equations of first order. Prerequisite: Math. 220. W, S, Su

322. Elementary Partial Differential Equations I. 3 hours. Second order linear partial differential equations and their initial value and boundary value problems. Separations of variables and Green's formula considerations. Eigenfunction expansions for homogeneous and inhomogeneous heat equation in finite domains. Sturm-Liouville problem. Fourier series. Prerequisites: Math. 310 and 321. W, S

323. Elementary Partial Differential Equations II. 3 hours. The potential equation, and the wave equation in finite domains. Semi-infinite domains. Fourier integrals. Cylindrical and spherical harmonics. Fourier-Bessel and Legendre-Bessel expansions. Prerequisite: Math. 322. W, S, Su

330. **Complex Variables for Engineering and Applied Mathematics I. 3 hours.** Credit is not given for Math. 330 if the student has credit in 332 or 333. Complex numbers and their geometrical representation, point sets of complex numbers, analytic functions, elementary functions, integration, power series, Taylor and Laurent expansions, the calculus of residues. Prerequisite: Math. 310.

331. **Complex Variables for Engineering and Applied Mathematics II. 3 hours.** Credit is not given for Math. 331 if the student has credit in 332 or 333. Properties of mappings, the calculus of residues and loop integration, conformal representation; application of analytic functions to the theory of flows, potentials and related fields. Prerequisite: Math. 330. W

332. **Complex Variables I. 3 hours.** Credit is not given for Math. 332 if the student has credit in 330 or 331. Power series in one variable, holomorphic functions, Cauchy's integral, Taylor and Laurent expansions. Prerequisite: Math. 312. S

333. **Complex Variables II. 3 hours.** Credit is not given for Math. 333 if the student has credit in 330 or 331. Analytic functions of several complex variables, harmonic functions, convergence of sequences of holomorphic functions, infinite products, normal families, holomorphic transformations, holomorphic systems of differential equations. Prerequisite: Math. 332. W, Su

340. **Modern Higher Algebra I. 3 hours.** Sets and real numbers, groups, rings. Prerequisite: Math. 133. W, S, Su

341. **Modern Higher Algebra II. 3 hours.** Euclidean and polynomial rings, vector spaces, linear transformations and matrices. Prerequisite: Math. 340. W, S, Su

342. **Modern Higher Algebra III. 3 hours.** Dual spaces, inner products spaces, modules, canonical forms of matrices, quadratic forms. Prerequisite: Math. 341. W, S, Su

343. **Formal Logic I. 4 hours.** Same as Phil. 343. Propositional logic, logic of quantifiers, and identity and completeness. Individual conferences on assigned papers are required. Prerequisite: Consent of the instructor; none for mathematics majors. W

344. **Formal Logic II. 4 hours.** Same as Phil. 344. Continues Math. 343. Mathematical analysis as decidability and computability. Arithmetization of syntax. Incompleteness and undefinability theorems. Introduction to axiomatic set theory. Individual conferences on assigned papers are required. Prerequisite: Math. 343. S

348. **Linear Transformations and Matrices. 5 hours.** Matrix algebra, determinants, inverses of matrices, rank and equivalence, linear independence, vector spaces and linear transformation, unitary and orthogonal transformations, characteristic equation of a matrix. Prerequisite: Math. 133. W, S, Su

350. **Introduction to Higher Geometry I. 3 hours.** Projective properties in the euclidean plane, extending the euclidean plane, the projective plane, axioms for the projective plane, conics, introduction of coordinates. Prerequisite: Math. 342.

351. Introduction to Higher Geometry II. 3 hours. Topics in geometry, projective planes, higher dimensional projective geometries, model as subspaces of a vector space, coordinatization. Prerequisite: Math. 350.

352. Introduction to Higher Geometry III. 3 hours. Introduction to differential geometry, curves, surfaces, manifolds imbedded in euclidean space, Riemannian geometry, first and second fundamental forms of imbedded surfaces. Prerequisites: Math. 310 and 351.

355. Introduction to Topology I. 3 hours. Set theory, topological spaces, metric spaces, continuous maps, connectedness, compactness, separation axioms, completely separable spaces, mappings into Hilbert spaces. Prerequisite: Math. 310. S

356. Introduction to Topology II. 3 hours. Locally connected spaces, arcs and arcwise connectivity, Cantor sets, Hahn-Mazurkiewicz theorem, elements of homotopy theory. Prerequisites: Math. 340 and 355. W, Su

357. Introduction to Topology III. 3 hours. Vector spaces, polytopes, homology theory, Euler-Poincare formula, simplicial mappings, Brouwer degree and Brouwer fixed-point theorem. Prerequisite: Math. 356. S

360. Elementary Theory of Numbers I. 3 hours. The basic concepts of the theory of numbers: divisibility, prime numbers, congruences, quadratic reciprocity law. Prerequisite: Math. 133 or permission of the department.

361. Theory of Numbers II. 3 hours. Functions of number theory, recurrence functions, diophantine equations, quadratic forms, Farey sequences and rational approximations. Prerequisite: Math. 360 or consent of the instructor.

362. Theory of Numbers III. 3 hours. Continued fractions, distribution of primes, algebraic numbers, polynomials, partitions, density of sequences of integers. Prerequisite: Math. 361 or consent of the instructor.

370. Introduction to Probability and Statistics. 3 hours. Probability models, univariate and multivariate distributions, random variables. Prerequisite: Math. 133. S

371. Statistics I. 3 hours. Statistical problems and procedures, estimation, testing hypotheses, distribution theory. Prerequisite: Math. 370. W

372. Statistics II. 3 hours. Analysis of variance, one-sample problem, non-parametric comparisons of locations. Prerequisite: Math. 371. S

375. Probability. 3 hours. Law of large numbers, central limit theorem, recurrent events, random walks, Markov chains. Prerequisite: Math. 370. W

377. Finite Differences I. 3 hours. Difference formulas, finite integration, summation of series, Bernoulli and Euler polynomials, interpolation. Prerequisite: Math. 133.

378. Finite Differences II. 3 hours. Approximate integration, beta and gamma functions, difference equations. Prerequisite: Math. 377. W

381. **Vector and Tensor Analysis I. 3 hours.** Algebra of vectors, vector differential calculus, differential geometry, Stokes theorem, divergence theorem application. Prerequisite: Math. 311.

382. **Vector and Tensor Analysis II. 3 hours.** Algebra of vectors, vector and scalar multiplication, tensor covariance, contravariance, geodesics, covariant differentiation, curvature tensor and interpretation, the Ricci and Einstein tensor, Riemannian curvature, flat space, Cartesian tensor, physical components of tensor, dynamics of a particle and of a rigid body, general dynamical systems. Prerequisite: Math. 311 or 381. W

385. **Laplace Transforms. 3 hours.** The Laplace transform and its inverse; properties of the transform; linear differential equations (ordinary and partial); linear difference equations, gamma, error, and Bessel functions; asymptotic series; nonelementary integrals; integral equations; Hankel transforms. Prerequisite: Math. 330. S

387. **Numerical Analysis I. 3 hours.** Math. 387 and 388 together provide a comprehensive introduction to linear numerical analysis. Computational methods and error analysis for matrix inversion, eigenvalues and eigenvectors, and linear approximations. Prerequisites: Math. 133 and 194 or 195.

388. **Numerical Analysis II. 3 hours.** Continuation of Math. 387. Prerequisite: Math. 387. W

389. **Numerical Analysis III. 3 hours.** Numerical integration and differentiation. Quadrature in n dimensions. Numerical integration of ordinary differential equations. Prerequisite: Math. 388. S

391. **Boolean Algebra and Switching Theory. 3 hours.** Sets, relations, function, equivalence relations, abstract Boolean algebra. Applications of Boolean algebra. Minimization of Boolean functions. Representation of finite Boolean algebras. Prerequisite: Math. 310 or 340.

392. **Introduction to Automata Theory. 3 hours.** Boolean rings and lattices as Boolean algebras. Synchronous sequential circuits. Mealy and Moore models of automata. Regular sets. Prerequisite: Math. 391. W

393. **Automata and Languages. 3 hours.** Types of automata and their events. The semigroup of an automaton. Basic decomposition theory. Introduction to formal languages. Grammars of types 0,1,2,3. Properties of context free languages. Prerequisite: Math. 392. S

395. **Systems Programming I. 3 hours.** The logical organization of a modern digital computer. Assembly language programming for such a machine. Prerequisite: Math. 194 or 195. W, S

397. **Systems Programming III. 3 hours.** Problems of planning and implementing an operating system for a modern digital computer so as to utilize its power to the fullest possible extent. Prerequisite: Math. 395.

399. Honors in Mathematics. 3 hours. May be repeated for credit. Seminars on special topics and advanced problems to permit students majoring in mathematics to do independent study under the guidance of senior members of the staff. Prerequisites: Math. 312 and 342 or consent of the instructor. W, S, Su

MILITARY SCIENCE

100. 125. Leadership Laboratory. No credit. The laboratory develops the cadet's **135. 145.** leadership characteristics by practical, progressive training in command **155. 165.** and drill. The numerical sequence corresponds to the cadet's year-and-**200. 225.** quarter progression and accomplishments: First quarter freshman—MilS. **235. 245.** 100; second quarter freshman—MilS. 125, sequentially. Prerequisites: **255. 265.** Approval of the department, enrollment in appropriate nonmilitary academic course, and full-time status.

The Basic Course—100 series.

General Prerequisites for all basic courses: Enrollment in the R.O.T.C. program; 30 class hours of approved nonmilitary academic subjects per year; concurrent enrollment in the appropriate leadership laboratory.

101. Organization of the United States Army and R.O.T.C. and Weapons and Marksmanship. 1 hour. The organization and function of the United States Army and R.O.T.C., including the history, purpose, and objectives. Five-hour introduction to weapons and marksmanship, providing a practical working knowledge of individual weapons and their use. Prerequisites: Approval of the department, enrollment in appropriate nonmilitary academic course, and full-time status.

102. Individual Weapons and Marksmanship and United States Army and National Security. 1 hour. Continues MilS. 101, including practical application on the University rifle range. Five hours of survey of the United States national defense policies and the role of the United States Army in their implementation. Prerequisite: MilS. 101 or approval of the department.

103. United States Army and National Security. 1 hour. Continues MilS. 102. Survey of United States national defense policies. Prerequisite: MilS. 102 or approval of the department.

104. Map Reading. 1 hour. Fundamentals of military map reading, including marginal information, map symbols, map orientation, and grid reference systems. Prerequisite: Approval of the department.

105. Terrain Analysis, Aerial Photography, and Introduction to Tactics. 1 hour. Continues MilS. 104. Aerial photography reading and interpretation, including terrain relationship and analysis. Introduction to small unit tactics. Prerequisite: MilS. 104 or approval of the department.

106. Introduction to Tactics. 1 hour. Continues MilS. 105, including application in the employment of squad and platoon units in offensive and defensive operations. Prerequisite: MilS. 105 or approval of the department.

107. American Military History. 1 hour. Survey of American military history from its origin through the Mexican War. The approach is analytical, with emphasis on leadership, the principles of war, and the growth of the military in the United States. Prerequisite: Approval of the department.

108. American Military History. 1 hour. Continues MilS. 107. From the American Civil War to World War I. Prerequisites: MilS. 107 and approval of the department.

109. American Military History. 1 hour. Continues MilS. 108. From World War I to the present. Prerequisites: MilS. 108 and approval of the department.

The Advanced Course—200 series.

General Prerequisites for all advanced courses: Junior standing; completion of the Military Science 100 series or the equivalent; 30 class hours of approved nonmilitary academic subjects per year; concurrent enrollment in the appropriate leadership laboratory.

201. Military Teaching. 2 hours. An introduction to the principles, methods, and techniques fundamental to military instruction, including lesson planning and presentation, use of training aids, and methods of evaluation. Prerequisites: See *General Prerequisites*, above.

202. Branches of the United States Army. 1 hour. Presentation of the branches of the Army with emphasis on their assigned special missions. Designed to provide students with sufficient information to select the branch of the service in which they desire to serve. Prerequisites: See *General Prerequisites*, above.

203. Leadership Theory and Counterinsurgency Operations. 2 hours. Responsibilities and techniques of leadership; introduction to counterinsurgency operations. Prerequisites: See *General Prerequisites*, above.

204. Introduction to Military Operations. 2 hours. Development of current tactical doctrine and communications to include the impact of modern weapons and materiel. Prerequisites: See *General Prerequisites*, above.

205. Advanced Military Operations and Introduction to Logistics. 2 hours. Origin and purpose of the military staff, its organization and functions. Acquisition and application of military intelligence. Familiarization with the general principles of training management. Introduction to logistics. Prerequisite: MilS. 204.

206. Role of the United States in World Affairs. 1 hour. Emphasis on the relationships between international conflict, national purpose, national power, and national policy. The relative geographic, economic, political, sociological, and military elements of power existing in the world today. Prerequisites: See *General Prerequisites*, above.

207. Logistics and Administration. 2 hours. Continues MilS. 205. Principles of troop movement and motor transportation. Introduction to basic concepts and fundamentals of Army administration. Prerequisite: MilS. 205.

208. Administration and Military Law. 2 hours. Continues MilS. 207, concluding Army administration. Fundamental concepts of military justice, the principles and methods of courtroom procedures and non-judicial punishment. Prerequisite: MilS. 207.

209. Service Orientation. 1 hour. Customs of the service; conduct and code of the officer; management of personal affairs; discussion of requirements and problems of entrance on active duty. Prerequisite: To be taken only during the cadet's final quarter of R.O.T.C.

MUSIC

100. Rudiments of Theory.* 3 hours. For nonmusic students or music students not qualified to enter Mus. 101. Notation, key signatures, scales, intervals, triads, metrical organization and rhythmic structure, dictation, and sight singing. **W, S, Su**

101. Theory of Music. 3 hours. Melodic analysis, introduction to harmony, and related keyboard drill. Prerequisite: Mus. 100 or the equivalent. All students must be concurrently registered in Mus. 107 and, if needed, Mus. 170.

102. Theory of Music. 3 hours. Study of triads, dominant sevenths and their inversion; introduction to nonharmonic tones and elementary modulation; small two-part and three-part forms; harmonic analysis; related keyboard drill. Prerequisite: Mus. 101 or the equivalent. **W**

103. Theory of Music. 3 hours. Secondary dominants and nondominant sevenths, continuation of nonharmonic tones and modulation; larger binary and ternary forms; related harmonic analysis and keyboard drill. Prerequisite: Mus. 102 or the equivalent. **S**

104. Theory of Music. 3 hours. Continuation of nondominant seventh chords; introduction to ninth, eleventh, thirteenth chords, and chromatic harmony; analysis of single-movement forms; harmonic analysis of music from the eighteenth and early nineteenth centuries; related keyboard drill. Prerequisite: Mus. 103 or the equivalent.

105. Theory of Music. 3 hours. Continuation of chromatic harmony; harmonic and structural analysis of music from the middle to the late nineteenth century; related keyboard drill. Prerequisite: Mus. 104 or the equivalent. **W**

106. Theory of Music. 3 hours. Harmony from the late nineteenth to the early twentieth centuries; harmonic and structural analysis; related keyboard drill. Prerequisite: Mus. 105 or the equivalent. **S**

107. Ear Training. 1 hour. The development of aural perception and sight-singing skills; material is correlated with that in Mus. 101. Prerequisite: Concurrent registration in Mus. 101.

108. Ear Training. 1 hour. The development of aural perception and sight-singing skills; material is correlated with that in Mus. 102. Prerequisite: Mus. 107 or the equivalent. W

109. Ear Training. 1 hour. The development of aural perception and sight-singing skill; material is correlated with that in Mus. 103. Prerequisite: Mus. 108 or the equivalent. S

110. Ear Training. 1 hour. The development of aural perception and sight-singing skill; material is correlated with that in Mus. 104. Prerequisite: Mus. 109 or the equivalent.

111. Ear Training. 1 hour. The development of aural perception and sight-singing skill; material is correlated with that in Mus. 105. Prerequisite: Mus. 110 or the equivalent. W

112. Ear Training. 1 hour. The development of aural perception and sight-singing skill; material is correlated with that in Mus. 106. Prerequisite: Mus. 111 or the equivalent. S

120. Basic Music Literature. 2 hours. An introduction to the standard concert repertory; intensive guided listening and analysis. Prerequisite: Mus. 101.

121. Basic Music Literature. 2 hours. Continues Mus. 120. An introduction to the standard repertory; intensive guided listening and analysis. Prerequisite: Mus. 120. W

130. Introduction to the Art of Music. 3 hours. Primarily for the layman. Guided listening, acquaintance with the stylistic and formal characteristics of important works of music literature. W

131. Introduction to the Art of Music. 3 hours. Primarily for the layman. Guided listening, acquaintance with stylistic and formal characteristics of important work of music literature. Prerequisite: Mus. 130 or consent of the instructor. W, S

132. Introduction to the Art of Music. 3 hours. Primarily for the layman. Guided listening, acquaintance with stylistic and formal characteristics of important works of music literature. Prerequisite: Mus. 131 or consent of the instructor. S, Su

151. Concert Band. ½ hour. Introduction to all types of band literature. Regular performances throughout the school year. Prerequisite: Consent of the instructor. W, S

152. Orchestra. ½ hour. Instrumental ensemble; performance of important instrumental literature of varied types. Prerequisite: Consent of the instructor. W, S

153. Choir. ½ hour. Introduction to important choral literature of all periods. Regular performances throughout the school year. Prerequisite: Consent of the instructor. W, S

154. Chamber Choir. ½ hour. Select group of approximately 30 singers. Performance

of music literature of all periods, composed for small ensembles. Prerequisite: Consent of the instructor. W, S

155. Madrigal Singers. ½ hour. Small, very select group; performance of music literature primarily of the pre-Baroque periods. Prerequisite: Consent of the instructor. W, S

156. Chorus. ½ hour. Ensemble singing primarily for average and beginning singers. Stress on choral technique and vocal development. Prerequisite: Consent of the instructor. W, S

158. Prep Band. ½ hour. Designed for less experienced players who wish to meet required skills for Concert Band. Prerequisite: Consent of the instructor. W, S

170. Class Piano I. No credit. Basic practical needs for music majors and minors who have little or no keyboard background. Students who pass the piano proficiency examination are exempt from this course. Prerequisite: Music major or minor.

171. Class Piano II. No credit. Continues Mus. 170. Students who pass the piano proficiency examination are exempt from this course. Prerequisite: Mus. 170 or consent of the instructor. W

172. Class Piano III. No credit. Continues Mus. 171. Students who pass the piano proficiency examination are exempt from this course. Prerequisite: Mus. 171 or consent of the instructor. S

200. Music in the Middle Ages and the Renaissance. 3 hours. A history of music from the beginnings of western chant to 1600; some preliminary study related to music in ancient times. Prerequisite: Mus. 103 or the equivalent.

201. Music in the Baroque Period. 3 hours. A history of music from about 1600 to 1750. Prerequisite: Mus. 200 or departmental approval. W

202. Music in the Classical Period. 3 hours. A history of music from about 1750 to 1825. Prerequisite: Mus. 201 or departmental approval. S

203. Music in the Romantic Period. 3 hours. A history of music from about 1825 to 1900. Prerequisite: Mus. 202 or departmental approval. Su

204. Music in the Contemporary Period. 3 hours. A history of music from about 1900 to the present. Prerequisite: Mus. 203 or departmental approval.

215. Opera. 3 hours. Historical survey tracing the growth and development of opera from its beginnings to the present day. Prerequisite: Sophomore standing.

216. Chamber Music. 3 hours. The growth and development of chamber music from the Baroque period to the present. Prerequisite: Sophomore standing. W

217. The Symphony. 3 hours. Historical survey of the growth and development of the symphony from its beginnings to the present. Prerequisite: Sophomore standing. S

250. Music for Elementary Teachers. 4 hours. Open only to students in the College of Education. Required for state elementary teaching certificates. Materials and methods for teaching basic music concepts through creating, and reading music; playing instruments, listening, singing; and body movement. Prerequisite: Mus. 100. W, S

300. Compositional Techniques. 3 hours. The study of late Renaissance music. Analysis of representative scores and written assignments in sixteenth century contrapuntal style. Prerequisites: Mus. 106 and 112 or the equivalents.

301. Compositional Techniques. 3 hours. The study of middle-to-late Baroque music. Analysis of representative scores and written assignments in eighteenth century contrapuntal style. Prerequisite: Mus. 300 or consent of the instructor. W

302. Compositional Techniques. 3 hours. The study of European and American twentieth century music. Analysis of representative scores and written assignments in composition in one or more of the several contemporary idioms. Prerequisite: Mus. 301 or consent of the instructor. S

PHILOSOPHY

101. Introduction to Philosophy. 4 hours. Some of the more significant problems which arise in such philosophical disciplines as metaphysics, the theory of knowledge, and the philosophies of religion, science, and history. Individual or small group conferences on assigned papers are required. Prerequisite: Second-quarter freshman standing. W, S, Su

102. Elementary Logic. 4 hours. Clarity and validity in argument; detection of fallacies; introduction to the use of symbolism in constructing proofs. Prerequisite: Second-quarter freshman standing. W, S, Su

103. Introduction to Ethics. 4 hours. An examination of representative classical and modern ethical philosophies; their import for social and political thought. Individual or small group conferences on assigned papers are required. Prerequisite: Second-quarter freshman standing. W, S, Su

150. Classics in the Philosophy of Science. 4 hours. Primary sources in the philosophy of science which have decisively influenced the development of modern science and Western thought since ancient times. Prerequisite: Sophomore standing. W

201. Ancient Philosophy. 4 hours. The development of Greek and Roman philosophy. Prerequisite: Junior standing or two courses in philosophy. S, Su

202. Medieval Philosophy. 4 hours. Reading and discussion of selected philosophical works from St. Augustine through William of Ockham. Prerequisite: Junior standing or two courses in philosophy. S

203. History of Modern Philosophy. 4 hours. The development of Western philoso-

phy from Descartes through Kant. Prerequisite: Junior standing or two courses in philosophy. W, S

206. **American Philosophy.** 4 hours. Main currents of philosophical thought in America. Prerequisite: One course in philosophy.

211. **Introduction to Formal Logic.** 4 hours. Elementary theory and methods of symbolic logic. Prerequisite: One course in philosophy, or one course in mathematics. W, Su

212. **Philosophy of Art.** 4 hours. Philosophical theories of art from ancient Greece to the present. Plato, Aristotle, Longinus, Hume, Kant, Nietzsche, Dewey, and others. W, S

214. **Philosophy of Religion.** 4 hours. Philosophical inquiry into the grounds of religious belief and the character of religious experience. Prerequisite: One course in philosophy. W

216. **Political and Social Philosophy.** 4 hours. Philosophical bases of social and political institutions and practices. The nature of the state; justice and law; rights and natural rights; social utility and public interest. S, Su

222. **Introduction to the Philosophy of Science.** 4 hours. The nature of scientific explanation and verification. The status of scientific theories; induction and probable inference. Special problems of the behavioral and social sciences. W, S, Su

224. **Philosophy of Education.** 4 hours. Examination of the nature and aims of education, the relationship of philosophical disciplines such as ethics and theory of knowledge to educational theory, and the application to pedagogy of various philosophical ideas and systems. S

299. **Seminar.** 4 hours. May be repeated twice. Selected topics. Prerequisites: Junior standing, and permission of the department. W

301. **Plato.** 4 hours. Selected dialogues. Prerequisite: Two courses in philosophy. S

302. **Aristotle.** 4 hours. Reading and discussion of some of the basic works. Prerequisite: Two courses in philosophy. W,Su

304. **Seventeenth Century Rationalism.** 4 hours. Selected readings and discussion from the works of Descartes, Spinoza, Leibnitz, and others. Individual conferences on assigned papers are required. Prerequisite: Two courses in philosophy. W

306. **British Empiricism.** 4 hours. Selected readings from the works of such philosophers as Locke, Berkeley, and Hume. Prerequisite: Two courses in philosophy. S

308. **Kant.** 4 hours. Kant's philosophy, with emphasis on the *Critique of Pure Reason.* Prerequisite: Two courses in philosophy. W

310. **Nineteenth Century and Early Twentieth Century Thought.** 4 hours. May be repeated for credit with the permission of the department. Studies of selections

from the writings of Hegel, Schelling, Fichte, Schopenhauer, Marx and Engels, J.S. Mill, Nietzsche, McTaggart, Green, Bradley, Peirce, Perry, and others. Prerequisite: Two courses in philosophy, one of which must be a 200-level course.

311. Inductive Logic. 4 hours. Traditional and contemporary problems of induction. Inductive logic and the theory of probability. Individual conferences on assigned papers are required. Prerequisite: Phil. 211 or consent of the instructor. S*

312. Recent and Contemporary Philosophy: Analysis and Logical Empiricism. 4 hours. Developments in recent philosophy which have their roots in the study of logic and language, such as logical atomism, positivism, and analytical philosophy. Prerequisite: Two courses in philosophy. Phil. 211 is recommended. W

314. Recent and Contemporary Philosophy: Phenomenology and Existential Philosophy. 4 hours. Recent developments in phenomenology and in the philosophy of personal existence. Selected readings from Kierkegaard, Husserl, Jaspers, Heidegger, Sartre, and others. Prerequisite: Two courses in philosophy. S

330. Theory of Knowledge. 4 hours. The grounds of belief; the nature of truth; evidence and proof; other related epistemological problems. Prerequisite: Two courses in philosophy, one of which must be a 200-level course. W, S

332. Ethics and Value Theory. 4 hours. The nature of moral judgments and moral reasoning; ethics as a normative discipline; definitions of "value"; ethical judgments as a kind of value judgment. Prerequisite: Two courses in philosophy, one of which must be a 200-level course. W, Su

334. Aesthetics. 4 hours. The aesthetic object. Form, representation, and meaning in art. Art and knowledge. Prerequisite: Two courses in philosophy, one of which must be a 200-level course. S

336. Metaphysics. 4 hours. Systematic analysis of selected metaphysical concepts, such as existence, substance and attribute, universals and particulars, change, identity, the individual, space and time. Recent as well as traditional points of view are considered. Prerequisite: Two courses in philosophy, one of which must be a 200-level course.

338. Philosophical Analysis of the Concept of Mind. 4 hours. Presuppositions and logical interconnections involved in the use of such terms as "mind," "thought," "action," "intention," and "will." Prerequisite: Two courses in philosophy, one of which must be a 200-level course. S

340. Philosophy of Language. 4 hours. Philosophical and logical problems concerned with the nature of meaning and the structure of language. Individual conferences on assigned papers are required. Prerequisites: Two courses in philosophy, one of which must be a 200-level course, but cannot be 211. In addition 211 or 343 or some demonstration of familiarity with the techniques of symbolic logic is required. In the last case, consent of the instructor is required.

343. Formal Logic I. 4 hours. Same as Math. 343. Propositional logic, logic of quantifiers, and identity and completeness. Individual conferences on assigned

papers are required. Prerequisite: Consent of the instructor; none for mathematics majors. W

344. Formal Logic II. 4 hours. Same as Math. 344. Continues Phil. 343. Mathematical analysis of decidability and computability. Arithmetization of syntax. Incompleteness and undefinability theorems. Introduction to axiomatic set theory. Individual conferences on assigned papers are required. Prerequisite: Phil. 343. S

345. Philosophical Problems of the Sciences. 4 hours. May be repeated for credit with the permission of the department. Reading and discussion of selected works on the aims and methods of science, the status of scientific theories, natural laws and theoretical entities, and the nature of explanation. Prerequisite: Two courses in philosophy, one of which must be a 200-level course. S

347. Philosophy of Law. 4 hours. Problems in the philosophy of law. Prerequisite: Two courses in philosophy. W

351. Problems in the Philosophy of Mathematics. 4 hours. An intensive study of a particular problem or nexus of problems in the philosophy of mathematics. The problems will vary from quarter to quarter. Individual conferences on assigned papers are required. Prerequisite: Phil. 343 or consent of the instructor; none for mathematics majors. W

399. Independent Study. 1 to 8 hours. Independent study, under the supervision of a staff member, of a topic not covered in the regular curriculum. The course is offered at the request of the student and only at the discretion of the staff members concerned. Prerequisite: Permission of the department. W, S, Su

PHYSICAL EDUCATION FOR MEN

101. Prescribed Exercises. 1 hour. May be repeated for a total of 6 hours. Exercises adapted to individual needs, capacities, and interests. Open only to students assigned by the Health Service.

106. Developmental Activities. 1 hour. Development and maintenance of physical fitness according to social and hygienic standards.

107. Beginning Swimming. 1 hour. Skills, knowledge, attitudes, and conditions. Open only to nonswimmers.

108. Intermediate Swimming and Water Polo. 1 hour. Improvement of swimming skills of those who swim inefficiently; development of skills necessary to play water polo reasonably well. Prerequisite: Ability to swim 50 yards.

109. Advanced Swimming and Diving. 1 hour. Development of skill in competitive swimming strokes and diving. Prerequisite: Ability to swim 200 yards.

110. Life Saving and Skin Diving. 1 hour. For students who wish to learn life saving skills and to develop the fundamental skills and knowledge for skin diving. The American Red Cross Senior Life Saving Certificate is awarded upon successful

completion of the course. Prerequisite: Ability to swim, for 100 yards, three of these four strokes: back, breast, crawl, and side.

112. **Individual Tumbling Stunts. 1 hour.** Skills, knowledge, attitudes, and conditions.

113. **Double Tumbling Stunts. 1 hour.** Skills, knowledge, attitudes, and conditions.

114. **Apparatus Stunts. 1 hour.** Skills, knowledge, attitudes, and conditions.

115. **Circus Stunts. 1 hour.** Skills, knowledge, attitudes, and conditions.

116. **Sabre Fencing. 1 hour.** Skills, knowledge, attitudes, and conditions. Prerequisite: PEM 119 with a grade of C or better or consent of the instructor.

117. **Boxing. 1 hour.** Skills, knowledge, attitudes, and conditions.

118. **Wrestling. 1 hour.** Skills, knowledge, attitudes, and conditions.

119. **Foil Fencing. 1 hour.** Skills, knowledge, attitudes, and conditions.

120. **Personal Defense Activities. 1 hour.** Skills, knowledge, attitudes, and conditions.

121. **Weight Training. 1 hour.** A program of weight-training activities that contributes to improvement in strength and fitness. Prerequisite: Recommendation of the staff.

122. **Individual Athletics. 1 hour.** Skills, knowledge, attitudes, and conditions.

123. **Weight Lifting. 1 hour.** Skills, knowledge, attitudes, and conditions.

124. **Track and Field Athletics. 1 hour.** Skills, knowledge, attitudes, and conditions.

125. **Flickerball. 1 hour.** Skills, knowledge, attitudes, and conditions.

126. **Touch Football. 1 hour.** Skills, knowledge, attitudes, and conditions.

127. **Softball. 1 hour.** Skills, knowledge, attitudes, and conditions.

128 **Soccer. 1 hour.** Skills, knowledge, attitudes, and conditions.

129. **Volleyball. 1 hour.** Skills, knowledge, attitudes, and conditions.

130. **Basketball. 1 hour.** Skills, knowledge, attitudes, and conditions.

131. **Speedball. 1 hour.** Skills, knowledge, attitudes, and conditions.

132. **Archery. 1 hour.** Skills, knowledge, attitudes, and conditions.

133. **Squash Racquets. 1 hour.** Skills, knowledge, attitudes, and conditions.

134. **Handball. 1 hour.** Skills, knowledge, attitudes, and conditions.

135. **Tennis. 1 hour.** Skills, knowledge, attitudes, and conditions.

136. **Badminton. 1 hour.** Skills, knowledge, attitudes, and conditions.

137. **Bowling. 1 hour.** Skills, knowledge, attitudes, and conditions.

138. **Golf. 1 hour.** Skills, knowledge, attitudes, and conditions.

139. **Backyard Sports. 1 hour.** Skills, knowledge, attitudes, and conditions.

140. **Boating and Fishing. 1 hour.** Skills, knowledge, attitudes, and conditions.

142. **Ballroom Dance. 1 hour.** Same as PEW 142. The techniques of social dancing.

143. **American Square Dance. 1 hour.** Same as PEW 143. Basic rhythms of square dance, etiquette and terminology, relation of round dances to American square dancing, appreciation of square dancing, several well-known American squares.

170. **Fundamentals of Baseball. 4 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

171. **Fundamentals of Basketball. 4 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

172. **Fundamentals of Football. 4 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

173. **Fundamentals of Gymnastics. 2 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

174. **Fundamentals of Swimming. 4 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

175. **Fundamentals of Track and Field Athletics. 4 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

176. **Fundamentals of Wrestling. 4 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

177. **Fundamentals of Special Activities. 2 hours.** Field sports and bowling. Skills, knowledge, attitudes, and conditions. Required for physical education majors.

178. **Fundamentals of Special Activities. 2 hours.** Badminton, volleyball, and tennis. Skills, knowledge, attitudes, and conditions. Required for physical education majors.

179. **Archery, Handball, Golf. 2 hours.** Skills, knowledge, attitudes, and conditions. Required for physical education majors.

180. **Fitness Programs. 4 hours.** Fundamental skills, knowledge, and practice of physical conditioning. Required for physical education majors.

185. Introduction to Physical Education. 3 hours. Physical education, health education, recreation and related fields. Required for physical education majors.

188. History of Sports. 4 hours. Development of sports and physical education in Europe and the United States since 1750. Required for physical education majors.

190. Principles of Recreation. 4 hours. History of leisure and recreation; concepts of play and recreation; major recreation agencies. Required for physical education majors.

191. Camp Counseling. 4 hours. The history and development of organized camping; examination of camp administrative organization; the role of the counselor. Analysis of program content and development; the nature and scope of counseling and guidance in relation to common camp behavior problems. Required for physical education majors.

250. Kinesiology. 5 hours. Mechanics and muscular action of balance and movement of the human body and their applications. Prerequisite: BioS. 160.

251. The Physiology of Muscular Activity. 4 hours. The physiological mechanisms associated with physical exercise. Prerequisites: BioS. 160 and 161.

252. The Theory of Prescribed Exercise. 4 hours. Prescription and conduct of recreational and exercise programs for selected physical handicaps. Prerequisites: BioS. 160 and 161.

253. Tests and Measurements in Physical Education. 4 hours. The application of tests and measurements to physical education. The development of tests. Prerequisite: PEM 185.

255. First Aid and the Prevention and Care of Athletic Injuries. 4 hours. American Red Cross First Aid. Diagnostic procedures for athletic injuries; treatment. Required for physical education majors. Prerequisite: BioS. 160 and 161.

260. The Organization of Physical Education Programs. 3 hours. The high school physical education program. Prerequisite: PEM 185.

261. The Organization of Athletic Programs. 3 hours. The organization and administration of interscholastic athletic competition. Required for physical education majors. Prerequisite: PEM 185.

262. The Organization and Administration of Intramural Sports Programs. 3 hours. Required for physical education majors. Prerequisite: PEM 185.

PHYSICAL EDUCATION FOR WOMEN

100. Conditioning Activities. 1 hour. Maintenance and improvement of physical fitness by exercise and body control.

102. Modified Activities. 1 hour. For students assigned by the Health Service. Students with physical disabilities participate according to their abilities.

105. Elementary Rhythms. 1 hour. Fundamentals of creative dance as an art form; rhythm, space and quality factors; principles of art; exploration and movement discovery for creative dance composition.

106. Intermediate Rhythms. 1 hour. Advanced work in fundamentals of dance as an art form; rhythm, space, and quality factors; principles of art; group and solo dance compositions.

107. Apparatus. 1 hour. Vaulting over side horse; basic skills and routines for uneven bars and balance beam.

108. Free Exercise. 1 hour. Components of free exercise: basic ballet, locomotor patterns, and tumbling; their use in routines.

110. Beginning Swimming. 1 hour. For students who are afraid of the water and unable to float or to swim. Water adjustment, floating, front crawl, and back crawl.

111. Advanced Beginning Swimming. 1 hour. Front crawl, back crawl, elementary back stroke, treading, floating, and plain front dive. Prerequisite: Front and back float.

112. Intermediate Swimming. 1 hour. Side stroke, breast stroke, surface dive. Review of front and back crawl and elementary back stroke. Prerequisite: Ability to swim one pool length (25 yards) with the front crawl, the elementary back stroke, or consent of the instructor.

113. Advanced Swimming. 1 hour. Springboard dive, all basic swimming strokes, and the butterfly. Emphasis on endurance. Some racing techniques and synchronized swimming. Prerequisite: Ability to swim 25 yards of the front crawl, back crawl, elementary back stroke, breast stroke, and side stroke.

115. Synchronized Swimming. 1 hour. The practice and presentation of strokes, stunts, sculling, and composition. Prerequisite: PEW 112 or consent of the instructor.

116. Beginning Diving. 1 hour. Springboard dive, back dives, somersault and twisting dives. Prerequisite: Ability to swim and execute plain front dive from the side of the pool.

120. Elementary School Game, Self Testing, and Rhythmic Skills. 2 hours. Analysis and development of skills used in the physical education program in the elementary school. Prerequisite: Sophomore standing.

122. Speedball. 1 hour. Fundamentals of team play based on the development of individual game skills.

123. Basketball. 1 hour. Skills and knowledge in beginning basketball. Prerequisite: Any one of PEW 100, 105, 110, 111, 112.

124. Volleyball. 1 hour. Development of skill in volleyball play, knowledge of rules, refereeing.

125. Softball. 1 hour. Skills and knowledge. Prerequisite: Any one of PEW 100, 105, 110, 111, 112.

126. Field Hockey. 1 hour. Skills, rules, and strategy.

127. Soccer. 1 hour. Skills, rules, and strategy.

128. Advanced Volleyball. 1 hour. Additional techniques, wider skills, greater development of team play. Prerequisite: PEW 124 or consent of the instructor.

130. Badminton. 1 hour. Development of badminton skills, knowledge of rules, tournament play.

131. Beginning Golf. 1 hour. Historical development, values, rules, etiquette, and skill techniques. Use of woods, irons, and putters.

132. Bowling. 1 hour. Development of skills.

133. Fencing. 1 hour. Fundamentals of foil fencing: mechanical principles, body movements, competition strategy. Prerequisites: PEW 100 and 105.

135. Archery. 1 hour. Knowledge, skills, and practice.

136. Tennis. 1 hour. Development of tennis skills, knowledge of rules, tournament play and procedures.

138. Track and Field. 1 hour. Basic track and field knowledge and skills. Prerequisite: Any one of PEW 100, 105, 110, 111, 112.

141. Stunts, Tumbling and Apparatus. 1 hour. Simple stunts and tumbling. Basic and intermediate levels of use on horse, buck, parallel bars, trampoline, and balance beam.

142. Ballroom Dance. 1 hour. Same as PEM 142. The techniques of social dancing.

143. American Square Dance. 1 hour. Same as PEM 143. Basic rhythms of square dance, etiquette and terminology, relation of round dances to American square dancing, appreciation of square dancing, several well-known American squares.

144. Folk Dance—Elementary. 1 hour. Traditional rhythms of various countries, appreciation of the background.

150. Professional Orientation. 3 hours. To introduce women physical education majors to the historical highlights, role of physical education in modern society, basic philosophical and scientific principles upon which the profession is founded and to acquaint the student with professional organizations, literature and career opportunities.

151. Body Mechanics and Basic Movement. 1 hour. Mechanics of body stabilization and movement; applications. Open only to physical education majors.

152. Soccer and Speedball. 1 hour. Skill techniques; rules and basic techniques of officiating; strategy; teaching progression. Does not satisfy the general education requirements.

153. Stunts and Tumbling. 1 hour. Basic skills, routines, practice and teaching methods. Does not satisfy general education requirement.

154. Volleyball, Track and Field. 1 hour. Basic skills, techniques, tournament play, and officiating of volleyball. Basic skills of track and field activities; shot, ball throwing and running activities. Does not satisfy the general education requirement.

155. Gymnastics and Apparatus I. 1 hour. Skill, practice, and teaching progressions. Does not satisfy the general education requirement.

156. Swimming II. 1 hour. Advanced skills with emphasis on teaching progressions. Does not satisfy the general education requirement. Prerequisite: PEW 110, 111, or 112.

157. Basketball I and Softball. 1 hour. Skills, rules, and tactics in beginning basketball and softball. Does not satisfy the general education requirement.

159. Basketball II and Field Hockey. 1 hour. Skill techniques; rules and basic techniques of officiating; strategy; teaching progression. Does not satisfy the general education requirement. Prerequisite: PEW 157 or consent of the instructor.

166. Elementary School Games. 3 hours. For kindergarten through eighth grade playground and gymnasium. Program planning, lesson planning, and source materials. Open only to physical education majors.

168. Gymnastics and Apparatus II. 1 hour. Intermediate and advanced skills and routines. Does not satisfy the general education requirement. Prerequisite: PEW 155.

200. Teaching of Dance and Gymnastics. 4 hours. To present foundations of learning rhythmic and gymnastic activities, teaching techniques, evaluation procedures, resource and teaching aids. Prerequisites: PEW 151 and Dance 100.

201. Archery and Golf. 2 hours. Elements of the games, rules, techniques of teaching, opportunity for individual practice in game techniques.

203. Badminton and Tennis. 2 hours. Elements of the games, rules, techniques of refereeing.

204. Supervised Teaching of Dance and Gymnastics. 2 hours. Laboratory experience in general education physical education classes designed to give the student supervised observation and teaching experience in techniques, methods, and class management in dance and gymnastics under close supervision and guidance of

staff members. Assignment to classes by arrangement. Prerequisites: PEW 151, 155, 168; Dance 100 and 235.

205. Tests and Measurements. 4 hours. Laboratory experience designed to instruct the student in evaluation techniques for assessing skill, knowledge, motor achievement, physical fitness status. Elementary techniques of test construction, statistical methods and research procedures. Prerequisite: Junior standing.

213. Teaching of Sports. 4 hours. Relation of the teaching of sports to fundamental educational and psychological principles. Methods and materials for class management, sport instruction and construction of unit and lesson plans. Prerequisites: PEW 151, 152, and 154 or consent of the instructor.

214. Supervised Teaching of Sports. 1 hour. Laboratory experience teaching in the general education physical education classes under the direct supervision of the staff designed to give the student guided opportunities to observe and acquire experience in technique, methods and class management. Assignment to classes by arrangement. Prerequisites: PEW 151, 152, 154, and 213, or consent of the instructor.

220. Elementary School Games and Self-Testing Activities. 2 hours. For elementary education majors. Methods and materials applicable to all elementary grades. Prerequisite: Junior standing.

221. Elementary School Rhythmic Activities. 2 hours. For elementary education majors. Methods and materials applicable to all elementary grades. Prerequisite: Junior standing.

222. Physical Education in the Elementary and Secondary School. 3 hours. Curriculum planning, teaching methods, activities for different age groups, evaluation of materials and organization for presentation. Prerequisites: PEW 166, Dance 100 and 235.

230. Kinesiology. 5 hours. Analysis of the mechanics of movement and muscular action in relationship to human movement and balance. Prerequisites: BioS. 160 and 161 and PEW 151.

250. Organization and Administration of Physical Education. 4 hours. Problems, evaluation, methods and procedures of administration of school activities at various age levels. Individual projects are required. Prerequisites: Senior standing or consent of the instructor.

280. The History of Sports. 4 hours. Historical development of current sports, the role sports have played in the cultures of the world; political and economic factors on practices in the conduct of sports. Prerequisite: Consent of the instructor.

281. First Aid. 4 hours. American Red Cross instruction in first aid. Individual projects are required.

282. The Organization of the School Health Program. 4 hours. The development of school health programs, the function and use of health sciences, healthful school living, the problems and needs of school children. Individual projects are required.

283. The History and Philosophy of Physical Education. 4 hours. The developmental changes in the philosophy of physical education as influenced by historical changes in society and culture. Individual projects are required. Prerequisite: Senior standing or consent of the instructor.

PHYSICAL SCIENCES

101. Physical Science. 4 hours. Together with PSci. 102 and 103, an introduction to the principles of the physical sciences. **W, S, Su**

102. Physical Science. 4 hours. Continues PSci. 101. Prerequisite: PSci. 101. **W, Su**

103. Physical Science. 4 hours. Continues PSci. 101. Prerequisite: PSci. 101. **S**

PHYSICS

101. General Physics (Mechanics and Heat). 5 hours. For students in Liberal Arts and Sciences and in Architecture. Dynamics of solids and heat. Lectures, with demonstrations and recitations, laboratory. Prerequisite: Trigonometry. **F**

102. General Physics (Electricity and Magnetism and Waves). 5 hours. For students in Liberal Arts and Sciences and in Architecture. Electricity and magnetism, particles and fields, electromagnetic waves, and behavior of waves. Lectures, with demonstrations and recitations, laboratory. Prerequisite: Phys. 101. **W**

103. General Physics (Modern Physics). 5 hours. For students in Liberal Arts and Sciences and in Architecture. Relativity, quantum mechanics, atomic structure, and the nucleus. Lectures, with demonstrations and recitations, laboratory. Prerequisite: Phys. 102. **S, Su**

111. General Physics I (Mechanics). 4 hours. Scalars and vectors; kinematics in one and two dimensions, conservation of mentum; Newton's laws; inertial systems, circular motion; work, potential energy, conservation of energy; harmonic motion. Lecture and discussion. Prerequisite: Credit or registration in Math. 131. **F, W, S, Su**

112. General Physics II (Mechanics, Thermodynamics). 5 hours. Angular momentum, moment of inertia; gravitational force, planetary motion; introduction to the physics of fluids; First and Second Laws of Thermodynamics; the ideal gas; kinetic theory of gases. Lecture, discussion, and laboratory. Prerequisites: Phys. 111 and credit or registration in Math. 132. **F, W, S, Su**

113. General Physics III (Electricity and Magnetism). 5 hours. Coulomb's law, Gauss' law; electrostatic field, potential; capacitance, resistance, D.C. circuits; the mag-

netic force, Biot-Savart law, Ampere's law; motion of charged particles in electromagnetic fields; electromagnetic induction. Lecture, discussion, and laboratory. Prerequisites: Phys. 112 and Math. 133. **F, W, S, Su**

114. General Physics IV (Wave Phenomena and Relativity). 5 hours. Displacement current, Maxwell's equations; basic wave behavior: the wave equation; sound, water and electromagnetic waves; reflection, refraction, interference, diffraction; geometrical optics; introduction to the special theory of relativity. Lecture, discussion and laboratory. Prerequisite: Phys. 113. **F, W, S, Su**

301. Electricity and Magnetism I. 4 hours. Applications of and problems in circuit theorems, electric fields, capacitance, energy and forces associated with these fields in free space and in matter. Prerequisites: Credit or registration in Phys. 114 and Math. 220. **F, S, Su**

302. Electricity and Magnetism II. 4 hours. Applications of and problems in circuit theorems, magnetic fields, inductance, energy and forces associated with these fields in free space and matter, electromagnetic induction, Maxwell's equations. Prerequisite: Phys. 301. **F, W**

303. Electricity and Magnetism III. 4 hours. Effects associated with changing fields and currents, transients, coupled circuits, filters, transmission lines, electromagnetic waves, circuit theorems in transient and steady state analysis. Prerequisite: Phys. 302. **W, S**

304. Electronics I. 4 hours. Theoory of electronic devices, linear and nonlinear analysis, applications of vacuum and semiconductor devices to circuits, amplifiers, biasing, feedback, oscillators, and special circuits. Prerequisite: Phys. 301. Phys. 302 and 303 are recommended. **F, S**

305. Electronics II. 4 hours. Pulse-shaping networks, logic circuits, control circuits, distributed amplifiers, special problems of transducers, special signal-to-noise techniques. Prerequisite: Phys. 304.

321. Atomic Physics. 4 hours. The properties of free electrons and ions, photons and their interaction with matter, atomic spectra and structure, introduction to quantum mechanics. Individual projects are required. Prerequisite: Phys. 114 or permission of the department. Credit or registration in Math. 220 or 321 is recommended. **F, W, Su**

322. Atomic and Molecular Physics. 4 hours. Diatomic molecules: vibrational spectra, potential energy curves, chemical bonding, band structure. Polyatomic molecules; Raman, infrared, rotational, and microwave spectra, force fields and chemical bonding. Individual projects are required. Prerequisite: Phys. 321. **W, S**

323. Elementary Solid State Physics. 4 hours. Crystal structure, thermal and dielectric properties of solids, free electron model of metals, band theory, semiconductor physics, dislocations and strength of solids. Individual projects are required. Prerequisite: Phys. 322. **F**

331. **Nuclear Physics. 4 hours.** Natural and artificial radioactivity, equipment for studying and producing high-energy particles, nuclear disintegrations, interaction of nuclear particles with each other and with matter, cosmic rays, mesons, recent developments in high-energy physics. Individual projects are required. Prerequisite: Phys. 321. S

341. **Theoretical Mechanics I. 4 hours.** Motion of a particle in one, two, and three dimensions, Kepler's laws and planetary motion, scattering of particles, conversion between laboratory and center of mass coordinate systems, conservation laws, motion of a rigid body in two dimensions. Individual projects are required. Prerequisites: Credit or registration in Phys. 114 and Math. 220.

342. **Theoretical Mechanics II. 4 hours.** Statics of extended systems, moving coordinate frames, fictitious forces and conservation laws, special theory of relativity, mechanics of continuous media. Individual projects are required. Prerequisite: Phys. 341. W, Su

343. **Theoretical Mechanics III. 4 hours.** Rigid-body motion in three dimensions, motion in gravitational fields, generalized coordinates and Lagrange and Hamilton equations, equations of constraint, small-vibration theory. Individual projects are required. Prerequisite: Phys. 342. S

361. **Thermal and Statistical Physics I. 4 hours.** Systems of particles, systems in equilibrium, laws of thermodynamics, thermal properties, application to simple physical and chemical systems, phase transitions, introduction to statistical mechanics. Individual projects are required. Prerequisite: Phys. 321. F, Su

362. **Thermal and Statistical Physics II. 4 hours.** Quantum statistics of ideal gases, magnetism and low temperatures, kinetic theory of transport processes, irreversible processes and fluctuations. Individual projects are required. Prerequisite: Phys. 361. W

371. **Light (Wave Optics). 4 hours.** Wave propagation and Maxwell's equations, interference and interferometers, gratings, circular aperture, echelon, resolving power. Prerequisites: Phys. 114 and credit or registration in Math. 220. F, S

372. **Light (Modern Optics I). 4 hours.** Crystals, polarized light, optics of metals, quantum theory of radiation, transition probability and oscillator strength, dispersion and scattering theory. Lecture and laboratory. Prerequisite: Phys. 371.

373. **Light (Modern Optics II). 4 hours.** Gaussian optics and general laws, special optical sytems and applications. Image formation, finite image-error theory, spot diagrams. Necessary mathematical tools for Fourier analysis and transfer functions. Individual projects are required. Prerequisite: Phys. 372.

381. **Modern Experimental Physics I. 4 hours.** Techniques and experiments in the physics of atoms, atomic nuclei, molecules, the solid state, and other areas of modern physical research. Lecture and laboratory. Prerequisites: Phys. 304 and 331. W, Su

382. **Modern Experimental Physics II. 4 hours.** Continues Phys. 381. Lecture and laboratory. Prerequisite: Phys. 381.

391. **Seminar. 1 hour.** Topics to be arranged. Prerequisite: Consent of the instructor.

392. **Undergraduate Research. 2 to 4 hours.** Research under the close supervision of a faculty member. Prerequisite: Consent of the instructor.

393. **Special Problems. 2 to 4 hours.** Special problems or reading by special arrangement with the faculty. Prerequisites: Senior standing and consent of the instructor.

PLASTIC AND GRAPHIC ARTS

201. **Colloquium. 1 hour.** Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Completion of the foundation program.

202. **Intermediate Drawing and Painting. 2 hours.** Various media. Prerequisite: Completion of the foundation program.

203. **Intermediate Painting. 3 hours.** Theories and practices of color and color phenomena; pigment, light, and spatial illusion. Prerequisite: Completion of the foundation program.

204. **Intermediate Painting. 4 hours.** Object imagery, spatial relationships, and emotional, analytical, and psychological content in various media. Prerequisite: Completion of the foundation program.

205. **Intermediate Painting. 5 hours.** Abstract painting: Theories of spatial organization, optical phenomena, experimental employment of various media. Prerequisite: Completion of the foundation program.

206. **Colloquium. 1 hour.** Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 201.

207. **Intermediate Painting. 2 hours.** Continues PGA 202. Various media. Prerequisite: Any one of PGA 202, 203, 204, 205.

208. **Intermediate Painting. 3 hours.** Continues PGA 203. Theories and practices of color and color phenomena; pigment, light, and spatial illusion. Prerequisite: Any one of PGA 202, 203, 204, 205.

209. **Intermediate Painting. 4 hours.** Continues PGA 204. Object imagery, spatial relationships, and emotional analytical, and psychological content in various media. Prerequisite: Any one of PGA 202, 203, 204, 205.

210. Intermediate Painting. 5 hours. Continues PGA 205. Abstract painting: Theories of spatial organization, optical phenomena, experimental employment of various media. Prerequisite: Any one of PGA 202, 203, 204, 205.

211. Colloquium. 1 hour. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 206.

212. Intermediate Painting. 2 hours. Continues PGA 207. Various media. Prerequisite: Any one of PGA 207, 208, 209, 210.

213. Intermediate Painting. 3 hours. Continues PGA 208. Theories and practices of color and color phenomena; pigment, light, and spatial illusion. Prerequisite: Any one of PGA 207, 208, 209, 210.

214. Intermediate Painting. 4 hours. Continues PGA 209. Object imagery, spatial relationships, and emotional, analytical, and psychological content in various media. Prerequisite: Any one of PGA 207, 208, 209, 210.

215. Intermediate Painting. 5 hours. Continues PGA 210. Abstract painting: Theories of spatial organization, optical phenomena, experimental employment of various media. Prerequisite: Any one of PGA 207, 208, 209, 210.

216. Colloquium. 1 hour. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 211.

217. Advanced Painting. 2 hours. Theory and practice involving the integration of object imagery and abstract concepts. Prerequisite: Any one of PGA 212, 213, 214, 215.

220. Advanced Painting. 5 hours. Comprehensive project oriented. Prerequisite: Any one of PGA 212, 213, 214, 215.

221. Colloquium. 1 hour. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 216.

222. Advanced Painting. 2 hours. Continues PGA 217. Theory and practice involving the integration of object imagery and abstract concepts. Prerequisite: Any one of PGA 217, 220, 318, 319, 320.

223. Advanced Painting. 3 hours. Synthesizing object imagery and abstract concepts, with emphasis on spatial analysis and color in various media. Prerequisite: Any one of PGA 217, 220, 318, 319, 320.

225. Advanced Painting. 5 hours. Continues PGA 220. Comprehensive project oriented. Prerequisite: Any one of PGA 217, 220, 318, 319, 320.

226. Colloquium. 1 hour. Current problems in the plastic and graphic arts presented

by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 221.

227. **Advanced Painting. 2 hours.** Continues PGA 222. Theory and practice involving the integration of object imagery and abstract concepts. Prerequisite: Any one of PGA 222, 223, 225, 324, 325.

228. **Advanced Painting. 3 hours.** Continues PGA 223. Synthesizing object imagery and abstract concepts with emphasis on spatial analysis and color in various media. Prerequisite: Any one of PGA 222, 223, 225, 324, 325.

230. **Advanced Painting. 5 hours.** Continues PGA 225. Comprehensive project oriented. Prerequisite: Any one of PGA 222, 223, 225, 324, 325.

231. **Colloquium. 1 hour.** Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Completion of the foundation program.

232. **Intermediate Sculpture. 2 hours.** Principles of kinetic sculpture through various means and materials. Prerequisite: Completion of the foundation program.

233. **Intermediate Sculpture. 3 hours.** Object oriented; emphasis on forming processes and materials. Includes preparatory drawings and sketches. Prerequisite: Completion of the foundation program.

234. **Intermediate Sculpture. 4 hours.** Comprehensive sculpture, stressing form and shape concepts. Methods of addition and extension in various media. Prerequisite: Completion of the foundation program.

235. **Intermediate Sculpture. 5 hours.** Abstract sculpture. Investigation of the principles of light, color volume, and scale, done as static constructions in various materials. Prerequisite: Completion of the foundation program.

236. **Colloquium. 1 hour.** Continues PGA 231. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 231.

237. **Intermediate Sculpture. 2 hours.** Forming processes. Prerequisite: Any one of PGA 232, 233, 234, 235.

238. **Intermediate Sculpture. 3 hours.** Continues PGA 233. Object oriented; emphasis on forming processes and materials. Includes preparatory drawings and sketches. Prerequisite: Any one of PGA 232, 233, 234, 235.

239. **Intermediate Sculpture. 4 hours.** Continues PGA 232. Principles of time and motion sculpture in various means and materials. Prerequisite: Any one of PGA 232, 233, 234, 235.

240. **Intermediate Sculpture. 5 hours.** Continues PGA 235. Abstract sculpture, inves-

tigating the principles of light, color volume, and scale, done as static constructions in various materials. Prerequisite: Any one of PGA 232, 233, 234, 235.

241. Colloquium. 1 hour. Continues PGA 236. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 236.

242. Intermediate Sculpture. 2 hours. Continues PGA 237. Forming processes. Prerequisite: Any one of PGA 237, 238, 239, 240.

243. Intermediate Sculpture. 3 hours. Continues PGA 238. Object oriented; emphasis on forming processes and materials. Includes preparatory drawings and sketches. Prerequisite: Any one of PGA 237, 238, 239, 240.

244. Intermediate Sculpture. 4 hours. Continues PGA 239. Principles of time and motion sculpture in various means and materials. Prerequisite: Any one of PGA 237, 238, 239, 240.

245. Intermediate Sculpture. 5 hours. Continues PGA 240. Abstract sculpture, investigating the principles of light, color volume, and scale, done as static constructions in various materials. Prerequisite: Any one of PGA 237, 238, 239, 240.

246. Colloquium. 1 hour. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 241.

247. Advanced Sculpture. 2 hours. Principles of light, form, and scale in essentially subtractive methods, executed in various media and means. Prerequisite: Any one of PGA 242, 243, 244, 245.

249. Advanced Sculpture. 4 hours. Projects involving figurative and abstract sculpture, emphasizing principles of scale and form relationships in various media through both direct and indirect means. Prerequisite: Any one of PGA 242, 243, 244, 245.

251. Colloquium. 1 hour. Continues PGA 246. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 246.

252. Advanced Sculpture. 2 hours. Continues PGA 247. Principles of light, form, and scale in essentially subtractive methods, executed in various media and means. Prerequisite: Any one of PGA 247, 249, 348, 350.

256. Colloquium. 1 hour. Continues PGA 251. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 251.

257. Advanced Sculpture. 2 hours. Continues PGA 252. Principles of light, form, and

scale in essentially subtractive methods, executed in various media and means. Prerequisite: Any one of PGA 252, 353, 354, 355.

261. Colloquium. 1 hour. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: Completion of the foundation program.

262. Intermediate Printmaking. 2 hours. Object and abstract studies relating the principles of drawing and design to the techniques of lithography and serigraphy. Prerequisite: Completion of the foundation program.

263. Intermediate Printmaking. 3 hours. Object and abstract studies relating the principles of drawing and design to the techniques of relief and intaglio. Prerequisite: Completion of the foundation program.

264. Intermediate Printmaking. 4 hours. Based on single and multiple object imagery. Theory, technique, and practice in the various graphic media, emphasizing experimentation. Prerequisite: Completion of the foundation program.

265. Intermediate Printmaking. 5 hours. Advanced theories of spatial principles, form, and color, developed through the various printmaking media. Prerequisite: Completion of the foundation program.

266. Colloquium. 1 hour. Continues PGA 261. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 261.

267. Intermediate Printmaking. 2 hours. Continues PGA 262. Object and abstract studies relating the principles of drawing and design to the techniques or relief and intaglio. Prerequisite: Any one of PGA 262, 263, 264, 265.

268. Intermediate Printmaking. 3 hours. Continues PGA 263. Object and abstract studies relating the principles of drawing and design to the techniques of lithography and serigraphy. Prerequisite: Any one of PGA 262, 263, 264, 265.

269. Intermediate Printmaking. 4 hours. Continues PGA 264. Based on single and multiple object imagery. Theory, technique, and practice in the various graphic media, emphasizing experimentation. Prerequisite: Any one of PGA 262, 263, 264, 265.

270. Intermediate Printmaking. 5 hours. Continues PGA 265. Advanced theories of spatial principles, form, and color, developed through the various printmaking media. Prerequisite: Any one of PGA 262, 263, 264, 265.

271. Colloquium. 1 hour. Continues PGA 266. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 266.

272. **Intermediate Printmaking. 2 hours.** Continues PGA 267. Object and abstract studies relating the principles of drawing and design to the techniques of relief and intaglio. Prerequisite: Any one of PGA 267, 268, 269, 270.

273. **Intermediate Printmaking. 3 hours.** Continues PGA 268. Object and abstract studies relating the principles of drawing and design to the techniques of relief and intaglio. Prerequisite: Any one of PGA 267, 268, 269, 270.

274. **Intermediate Printmaking. 4 hours.** Continues PGA 269. Based on single and multiple object imagery. Theory, technique, and practice in the various graphic media, emphasizing experimentation. Prerequisite: Any one of PGA 267, 268, 269, 270.

275. **Intermediate Printmaking. 5 hours.** Continues PGA 270. Advanced theories of spatial principles, form, and color, developed through the various printmaking media. Prerequisite: Any one of PGA 267, 268, 269, 270.

276. **Colloquium. 1 hour.** Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 271.

277. **Advanced Printmaking. 2 hours.** Theory and practice involving the synthesis of object imagery, abstract concepts, and media in printmaking. Prerequisite: Any one of PGA 272, 273, 274, 275.

281. **Colloquium. 1 hour.** Continues PGA 276. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 276.

282. **Advanced Printmaking. 2 hours.** Continues PGA 277. Theory and practice involving the synthesis of object imagery, abstract concepts, and media in printmaking. Prerequisite: Any one of PGA 277, 378, 379, 380.

286. **Colloquium. 1 hour.** Continues PGA 281. Current problems in the plastic and graphic arts presented by professionals active in the field. Provides a basis for planning, executing, and evaluating projects in courses in the student's major field. Prerequisite: PGA 281.

287. **Advanced Printmaking. 2 hours.** Continues PGA 282. Theory and practice involving the synthesis of object imagery, abstract concepts, and media in printmaking. Prerequisite: Any one of PGA 282, 383, 384, 385.

318. **Synthesis of the Plastic Arts and Design. 3 hours.** Interrelation of the plastic and graphic arts through experiences with two-dimensional and three-dimensional projects. Prerequisite: Any one of PGA 212, 213, 214, 215.

319. **Advanced Painting. 4 hours.** Scale, form, and proportion appropriate to architectural spaces, using a wide range of materials and techniques. Project models and presentation required. Prerequisite: Any one of PGA 212, 213, 214, 215.

320. **Advanced Painting. 5 hours.** Projects based on object imagery where scale and form are appropriate to spaces in architectural contexts, involving both traditional and contemporary media. Total presentation, models required; techniques of presentation. Prerequisite: Any one of PGA 212, 213, 214, 215.

324. **Adanced Painting. 4 hours.** Continues PGA 319. Scale, form, and proportion appropriate to architectural spaces, using a wide range of materials and techniques. Project models and presentation required. Prerequisite: Any one of PGA 217, 220, 318, 319, 320.

325. **Advanced Painting. 5 hours.** Continues PGA 320. Projects based on object imagery where scale and form are appropriate to spaces in architectural contexts, involving both traditional and contemporary media. Total presentation, models required; techniques of presentation. Prerequisite: Any one of PGA 217, 220, 318, 319, 320.

329. **Advanced Painting. 4 hours.** Continues PGA 324. Scale, form, and proportion appropriate to architectural spaces, using a wide range of materials and techniques. Project models and presentation required. Prerequisite: Any one of PGA 222, 223, 225, 324, 325.

330. **Advanced Painting. 5 hours.** Continues PGA 325. Projects based on object imagery where scale and form are appropriate to spaces in architectural contexts, involving both traditional and contemporary media. Total presentation, models required; techniques of presentation. Prerequisite: Any one of PGA 222, 223, 225, 324, 325.

348. **Synthesis of the Plastic Arts and Design. 3 hours.** Interrelation of the plastic and graphic arts through experiences with two-dimensional and three-dimensional projects. Prerequisite: Any one of PGA 242, 243, 244, 245.

350. **Advanced Sculpture. 5 hours.** Projects, object imagery or abstract sculpture appropriate to architectonic spaces. Prepared drawings and models, unlimited materials and presentation methods. Prerequisite: Any one of PGA 242, 243, 244, 245.

353. **Advanced Sculpture. 3 hours.** Major developments synthesizing object imagery and abstract concepts with emphasis on scale and spatial relations. Prerequisite: Any one of PGA 247, 249, 348, 350.

354. **Advanced Sculpture. 4 hours.** Continues PGA 249. Projects involving figurative and abstract sculpture, emphasizing principles of scale and form relationships in various media through both direct and indirect means. Prerequisite: Any one of PGA 247, 249, 348, 350.

355. **Advanced Sculpture. 5 hours.** Continues PGA 350. Projects, object imagery or abstract sculpture appropriate to architectonic spaces. Prepared drawings and models, unlimited materials, and presentation methods. Prerequisite: Any one of PGA 247, 249, 348, 350.

358. Advanced Sculpture. 3 hours. Continues PGA 353. Major developments synthesizing object imagery and abstract concepts with emphasis on scale and spatial relations. Prerequisite: Any one of PGA 252, 353, 354, 355.

359. Advanced Sculpture. 4 hours. Continues PGA 354. Projects involving figurative and abstract sculpture, emphasizing principles of scale and form relationships in various media through both direct and indirect means. Prerequisite: Any one of PGA 252, 353, 354, 355.

360. Advanced Sculpture. 5 hours. Continues PGA 355. Projects, object imagery or abstract sculpture appropriate to architectonic spaces. Prepared drawings and models, unlimited materials and presentation methods. Prerequisite: Any one of PGA 252, 353, 354, 355.

378. Synthesis of the Plastic Arts and Design. 3 hours. Interrelation of the plastic and graphic arts through experiences with two-dimensional and three-dimensional projects. Prerequisite: Any one of PGA 272, 273, 274, 275.

379. Advanced Printmaking. 4 hours. Emphasizing the integration of print units into a large-scale context. Prerequisite: Any one of PGA 272, 273, 274, 275.

380. Advanced Printmaking. 5 hours. Primarily abstract, emphasizing color and the elements of organization, synthesizing mass printing techniques with the hand process. Prerequisite: Any one of PGA 272, 273, 274, 275.

383. Advanced Printmaking. 3 hours. Art-print making, synthesizing the various media, with emphasis on advanced theories of color and form. Prerequisite: Any one of PGA 277, 378, 379, 380.

384. Advanced Printmaking. 4 hours. Continues PGA 379. Emphasizing the integration of print units into a large-scale context. Prerequisite: Any one of PGA 277, 378, 379, 380.

385. Advanced Printmaking. 5 hours. Continues PGA 380. Primarily abstract, emphasizing color and the elements of organization, synthesizing mass-printing techniques with the hand process. Prerequisite: Any one of PGA 277, 378, 379, 380.

388. Advanced Printmaking. 3 hours. Art-print making, synthesizing the various media, with emphasis on advanced theories of color and form. Prerequisite: Any one of PGA 282, 383, 384, 385.

389. Advanced Printmaking. 4 hours. Continues PGA 384. Emphasizing the integration of print units into a large-scale context. Prerequisite: Any one of PGA 282, 383, 384, 385.

390. Advanced Printmaking. 5 hours. Primarily abstract, emphasizing color and the elements of organization, synthesizing mass-printing techniques with the hand process. Prerequisite: Any one of PGA 282, 383, 384, 385.

POLITICAL SCIENCE

110. The Government of Illinois. 4 hours. The organization and powers of the major branches of the government of Illinois, relations with national and local governments, the legal, political, and administrative problems raised within the structure.

150. American Government: Basic Principles. 4 hours. Historical development and operation of the American constitutional system. Analysis of federalism, civil liberties, and methods of popular control of government. It is strongly recommended that the student take both PolS. 150 and 151 to achieve minimal competence in this area. Prerequisite: Sophomore standing. **F, W, S, Su**

151. American Government: Organization and Powers. 4 hours. Nature, structure, powers, and procedures of legislative, executive, and judicial departments in the state and in the nation. Basic structure of local government. Prerequisite: PolS. 150. **F, W, S, Su**

155. American Government: Basic Principles. 4 hours. Honors course for PolS. 150. Prerequisite: University grade-point average of 4.00 or above or James Scholar status and sophomore standing. **F**

156. American Government: Organization and Powers. 4 hours. Honors course for PolS. 151. Prerequisite: PolS. 150 or 155 with James Scholar status or a 4.00 University grade-point average. **W**

205. Municipal Government and Administration. 4 hours. The growth of cities in the United States; legal problems of cities; intergovernmental relations; charters and charter drafting; powers and forms of government organization; politics and pressure-group activity; administrative organization; municipal functions and services; revenue problems. Prerequisites: PolS. 150 and 151. **F, W, S, Su**

212. State Government. 4 hours. Organization and powers of state governments in the United States; constitutions and problems of revision; legislatures and legislation; administrative problems; the state judiciary and judicial reform; intergovernmental relations; financing major services. Prerequisites: PolS. 150 and 151. **F, W**

226. Political Parties. 4 hours. Historical development, organization, and functioning of state and national parties; committees, conventions, campaigns, and finances; party platforms and issues. Prerequisites: PolS. 150 and 151. **W**

227. Public Opinion and Propaganda. 4 hours. The nature of public opinion and propaganda; the role of mass media and other forces shaping public opinion; problems of polling and behavior analysis; propaganda techniques; the impact of public opinion and propaganda upon decision making and the formation of public policy. Prerequisites: PolS. 150 and 151.

261. Public Administration. 4 hours. Introduction to the principles of public administration on all levels of government; budgeting, finance, personnel functions; organization and administration of staff and line agencies; relations with legislative and judicial departments. Prerequisites: PolS. 150 and 151. **F**

281. United States Foreign Policy. 4 hours. Credit is not given for PolS. 281 if the student has credit in 285. Analysis of the internal and external factors which influence the formulation and execution of the foreign policy of the United States. Major problems of contemporary foreign policy; constitutional, organizational, administrative, and intellectual factors. F

284. Introduction to International Relations. 4 hours. The basic characteristics of the international system, the nature of international relations, major problems and conflicts, the attempts to solve them. Nationalism, diplomacy, and war. F, W, S, Su

285. Comparative Foreign Policies. 4 hours. Credit is not given for PolS. 285 if the student has credit in 281. Comparative study of foreign policies of major nations and blocs of nations. Major national interests, substance of foreign policies, and methods of policy formulation. W

286. International Organization. 4 hours. The evolution of international organizations; structure and operation of various types of contemporary international institutions. Special attention to the United Nations, its history, operations, and progress. S

299. Honors Course. 2 to 4 hours. May be elected for three quarters for a maximum of 10 hours. Independent reading and research. Open only to students majoring in political science. Prerequisites: Senior standing, University grade-point average of 4.00, and permission of the department. F, W, S

307. Urban Politics Seminar. 4 hours. Analysis of the structure and dynamics of political parties and organizations in urban areas. Intensive study of the power structure, strength, and weakness of the Democratic and Republican parties in urban areas, using Chicago and its suburbs as a laboratory. Prerequisites: PolS. 205 and consent of the instructor. F

315. Legislatures and Legislation. 4 hours. The legislative function in government; structure and organization of American legislatures, national, state, and local; party organization in legislatures; legislative procedure; pressure groups and lobbying; relation of legislature to other branches of government; problems of legislative reorganization. Prerequisites: PolS. 150 and 151.

316. The President and Congress. 4 hours. Analysis of the relationship of the President and Congress; problems involved in the formulation and execution of public policy. Prerequisite: PolS. 150 and 151. S

317. Intergovernmental Relations. 4 hours. The origin and evolution of the American federal system; federal-state constitutional relationships; intergovernmental fiscal relations; the political cultures; interstate relations; regionalism; state-local relations; interlocal relations and cooperative federalism in functional areas. Prerequisite: PolS. 205 or 212. F, W, Su

318. Science, Technology, and Public Policy. 4 hours. Examination of the impact of science and technology on governmental policy in the United States. Responses

of the national executive and legislative branches of government, inter-governmental aspects of technological advances. **W, Su**

327. **Public Opinion and Political Communication. 4 hours.** The nature of public opinion and political communication systems; patterns of opinion distribution and techniques for opinion measurement; forces shaping public opinion with emphasis on the mass media; the impact of public opinion on public policy; comparison of political communication patterns in the United States with less developed and totalitarian nations. Individual conferences on assigned papers are required. Prerequisite: 6 hours of political science, sociology, or modern history. **F**

328. **Propaganda and the Language of Politics. 4 hours.** The nature of propaganda, political symbols, and the language of politics; the uses of political symbols and propaganda in the political processes of democratic and totalitarian societies; international propaganda and psychological warfare; methods and uses of propaganda analysis. Individual conferences on assigned papers are required. Prerequisite: 6 hours of political science, sociology, or modern history. **W**

329. **Organizational Behavior. 4 hours.** The nature and forms of organizational behavior in modern society; particular emphasis on organization and environment. Detailed analysis of one specific organization. Prerequisites: PolS. 150, 151, and 261. **F**

330. **Political Behavior. 4 hours.** An introduction; includes analysis of voting behavior, political leadership, policy formation, and related matters. **F, W**

334. **Comparative Government: Great Britain. 4 hours.** The government of Great Britain compared especially with that of the United States and the U.S.S.R. to illustrate and contrast the politics and governments of democracies and dictatorships. **F, S, Su**

335. **Comparative Government: The Soviet Union. 4 hours.** The nature, evolution, and problems of the political and economic system of the U.S.S.R. **F, W**

336. **Comparative Government: France and Germany. 4 hours.** Evolution of the political systems; analysis of reforms since 1945; operation of the governments and political parties. **W, S**

342. **Government and Politics of Latin America. 4 hours.** Comparative examination of the governments and politics of selected Latin American countries. Patterns of political leadership and followership, governmental processes, problems of development, and foreign political influence. Prerequisites: PolS. 150 and 151. PolS. 380 is highly recommended. **S**

345. **African Politics South of the Sahara. 4 hours.** Designed to provide the information and analytical tools to interpret current sub-Saharan African politics. Politics in traditional African societies; politics under colonial rule; the struggle for independence; post-independence politics. Prerequisite: Two courses in political science, history, or anthropology. **F, W**

346. **Political Patterns in West Africa. 4 hours.** Different governmental patterns in West Africa, their evolution, and the underlying problems they are designed to meet. One-party African socialism, various forms of multiparty government, and military regimes. S

349. **Governments and Politics of Asia. 4 hours.** A comparative and analytical description of the political processes, institutions, and foreign policies of India, China, and Japan. The relationships of these nations to the West. S

351. **Constitutional Law. 4 hours.** Constitutional provisions and principles as they have developed through Supreme Court interpretation; the amending process; federalism; commerce, taxing, and war powers; due process of law; the constitutional relations between the three major branches of government. Prerequisites: PolS. 150 and 151. F

353. **Seminar in Problems of Constitutional Law. 4 hours.** Supervised individual study of selected problems arising in the interpretation of the United States Constitution. Prerequisites: Consent of the instructor and PolS. 351 or 355. S

355. **The Constitution and Civil Liberties. 4 hours.** The nature and constitutional positions of freedom of religion, speech, press, and others; varying interpretations of these freedoms; difficulties encountered in protecting them; problems of discrimination against racial, religious, and other minorities. Prerequisites: PolS. 150 and 151. W, Su

356. **Administrative Law. 4 hours.** Legal problems arising in the relationships between the citizen and the government official; administrative rule making and enforcement; judicial review of administrative actions. Prerequisites: Consent of the instructor and PolS. 261 or 351.

362. **Seminar: Public Administration. 4 hours.** Supervised individual study of selected problems of public administration. Prerequisite: PolS. 261 or 363. S

363. **Comparative and International Administration. 4 hours.** Analysis of bureaucratic structure and behavior in selected countries; examination of the problems and practices of the international civil service. Consideration of a conceptual framework for comparative administrative analysis. Prerequisites: PolS. 150 and 151. W

380. **Introduction to the Study of Emerging Nations. 4 hours.** A comparative study of the political, economic, and social characteristics of underdeveloped nations. Colonialism, nationalism, political ideologies, and problems of effective political organization and functioning. Prerequisite: 6 hours of political science, economics, sociology, or modern history. F, W

381. **Politics of Emerging Areas. 4 hours.** Analysis of selected governments and blocs of governments in Asia, Africa, and Latin America which represent different types of problems and different stages of the development process. Relations between underdeveloped and developed areas, with emphasis on United States aid policies. Prerequisite: PolS. 380. S

387. **International Law. 4 hours.** The theory and practice of international law; particular reference to its evolving role in the contemporary world. Decisions of international tribunals, past and present, are analyzed and the contributions of the United Nations to the progressive development of international law are examined. Prerequisite: PolS. 150. **W**

388. **Seminar: Problems of American Foreign Relations. 4 hours.** Supervised individual study of selected problems of contemporary United States foreign relations. Prerequisite: PolS. 281 or 284 or consent of the instructor.

393. **History of Political Theory. 4 hours.** A survey of the evolution of Western political thought from the Greeks through the sixteenth century. An analysis of selections from the writings of outstanding thinkers of the period; an examination of some contemporary theorists who continue to develop the political theories of these early thinkers. Prerequisite: Junior standing. **F, Su**

394. **History of Political Theory. 4 hours.** Continues PolS. 393. An examination of the development of modern political theory from the seventeenth century to the contemporary period. The influence of Hobbes, Locke, and Rousseau on the development of liberalism and the modern welfare state is examined. The crisis of modern democracy is analyzed against the challenges of Marxism and totalitarianism. An examination of some contemporary theorists whose work parallels that of Hobbes, Locke, Rousseau, Burke, Marx, and J. S. Mill. Prerequisite: PolS. 393. W

397. **American Political Thought. 4 hours.** Political thought of the colonial, revolutionary, constitution-making, and Civil War periods; consideration of recent criticisms and defense of popular government as applied in the United States. **S**

399. **Seminar in Political Theory. 4 hours.** Supervised individual study and research on selected problems or works in political theory. Prerequisite: PolS. 393 or consent of the instructor.

PSYCHOLOGY

100. **Introduction to Psychology. 4 hours.** Credit is not given for Psch. 100 if the student has credit in 102. Introduction to the study of behavior; methods, principles, and applications to the understanding of human actions. Lectures, demonstrations, and laboratory investigations. **F, W, S, Su**

102. **Introduction to Psychology, Honors Course. 5 hours.** Credit is not given for Psch. 102 if the student has credit in 100. Systematic introduction to psychology as a behavioral science; methods of psychological investigation, research findings, theoretical interpretations. Lectures, demonstrations, discussion sections, and laboratory experiments. Prerequisite: Honors status or consent of the instructor. **F, W, S**

110. **Psychology of Adjustment. 4 hours.** Basic principles of behavior in relation to

the development, modification, and assessment of adjustive processes. Prerequisite: Psch. 100 or 102. **F, W, S, Su**

115. Social Psychology. 4 hours. Credit is not given for Psch. 115 if the student has credit in Soc. 130. The principles of behavior applied to the individual in the social situation. Prerequisite: Psch. 100 or 102. **F, W, S, Su**

130. Psychology in Business and Industry. 4 hours. Application of the methods and findings of psychology to the study of people at work. Emphasis on problems of personnel selection, training, work methods, safety, motivation, labor-management relations, counseling, and related topics. Prerequisite: Psch. 100 or 102 or consent of the instructor. **F, W, S, Su**

210. Psychology of Personality. 4 hours. Systematic study of the development, dynamics, and structure of personality; methodology, theory, and empirical research. Prerequisite: 8 hours of psychology. **W**

215. Psychology of Attitude and Opinion. 5 hours. Same as Spch. 215. Survey of behavioral approaches to the measurement of social attitudes and opinions; determinants and correlates of public attitudes and opinions. Lecture and participation in field and laboratory studies. Individual projects and readings are assigned. Prerequisite: 8 hours of psychology or consent of the instructor. **F**

220. Psychology of Childhood and Adolescence. 4 hours. Development of behavior in infancy, childhood, and youth. Emphasis on learning, motivational, and biosocial factors. Prerequisites: 8 hours of psychology or consent of the instructor. **S**

221. Child Growth and Development. 4 hours. Growth and development in infancy, childhood, and adolescence; emphasis on genetic, constitutional, and organic determinants in relation to environmental factors, particularly in early stages. Prerequisite: 8 hours of psychology or consent of the instructor. **F**

222. Psychology of Adulthood and Old Age. 4 hours. Determinants of adjustment in marriage, educational and vocational pursuits, retirement, and old age; emphasis on learning, motivational, and biosocial factors. Prerequisite: 8 hours of psychology or consent of the instructor. **W**

224. Educational Psychology. 4 hours. Basic undergraduate course in the psychology of education. Facts and principles of physical growth and development, learning, concept formulation, acquired motivation, and achievement testing applied to the classroom situation. Prerequisite: Psch. 100 or 102. **F, Su**

230. Occupational and Vocational Psychology. 4 hours. Relations of individual aptitudes, interests, and personality characteristics to occupational choice and success. Prerequisite: 8 hours of psychology or consent of the instructor. **W**

240. Introduction to Psychological Testing. 4 hours. Not open to students electing Psch. 243. Introduction to the principles of psychological rating, testing, and polling, with a survey of representative techniques. Emphasis on the basic concepts of objectivity, reliability, and validity. Lectures, laboratory, and conference sections. Prerequisite: 8 hours of psychology. **F, W, S, Su**

241. Research Methods in Psychology. 3 hours. Techniques and problems associated with the study of behavior. Emphasis on methodology in human and animal research, preparatory to the understanding of laboratory and naturalistic investigations. Prerequisite: Psch. 100 or 102. **F, W, S**

243. Statistical Methods in Behavioral Science. 5 hours. Credit is not given for Psch. 243 if the student has credit in QM 171 or Soc. 185 or Geog. 185. Introduction to the use of statistics in behavioral research: descriptive statistics, statistical inference, elementary correlational methods. Lectures and laboratory. Prerequisites: 8 hours of psychology or sociology and consent of the instructor. **F, W, S, Su**

247. Differential Psychology. 4 hours. The nature, determinants, and correlates of individual and group differences in behavior. Prerequisite: Psch. 240 or 243 or consent of the instructor. S

250. Introduction to Experimental Psychology I. 5 hours. Critical survey of experimental findings, special methods, and laboratory practicum in basic areas of psychology: psychophysical methods, sensory processes, perception. Prerequisites: Psch. 241 and 243 or the equivalents and consent of the instructor. S

251. Introduction to Experimental Psychology II. 5 hours. Critical survey of experimental findings, special methods, and laboratory practicum in basic areas of psychology: simple learning and conditioning, primary and acquired drives. Prerequisites: Psch. 241 and 243 or the equivalents and consent of the instructor. **F, W, Su**

252. Experimental Psychology III. 5 hours. Critical survey of experimental findings, special methods, and laboratory practicum in basic areas of psychology; verbal learning, transfer of training, retention, problem solving, and concept formation. Prerequisites: Psch. 241 and 243 or the equivalents and consent of the instructor. S

256. Introduction to Physiological Psychology. 5 hours. Critical survey of experimental findings, methods of research, and laboratory practicum in the physiological correlates of behavior. Prerequisites: Psch. 241 and 243 or equivalent, and consent of the instructor. **F, W**

291. Special Topics (Honors). 2 hours. May be repeated for a total of 6 hours. Reading, discussion, and written reviews of current technical literature. Prerequisites: Any two of Psch. 250, 251, 252, 256, or 318 and consent of the instructor. **W, S**

299. Readings and Research. 2 to 6 hours. May be repeated for a maximum of 18 hours. Individual research investigation of a special problem under direction of a staff member. Prerequisites: Any two of Psch. 250, 251, 252, 256, or 318, and consent of the instructor. **F, W, S, Su**

315. Psychology of Social Influence. 4 hours. Methodology, results, and interpretations of studies of the influence of social variables on attitude development and

modification, acculturation, perception, and judgment. Prerequisite: Graduate standing or consent of the instructor. S

317. Social Development. 4 hours. Theories and research on the effects of social evaluation, imitation and observational learning, and other social factors on the development of cognition, language, and attitudes in children and adolescents. Emphasis on the consequences of impoverished or atypical social environments. Prerequisites: Psch. 220 or the equivalent and consent of the instructor. W

318. Experimental Social Psychology. 4 hours. Critical survey of experimental studies of independence, power, influence, social learning and perception, and other aspects of social behavior, with laboratory practicum and demonstrations. Prerequisites: Psch. 115, 241, and 243 or the equivalents and consent of the instructor. W

323. Psychology of the Exceptional Child. 4 hours. Methods, results, and interpretations of studies of physically, intellectually, and emotionally deviant children, with special reference to their implications for education and behavior modification. Prerequisite: Psch. 220 or the equivalent. S

332. Personnel Psychology. 4 hours. Systematic study of the development and utilization of psychological techniques of personnel selection, classification, and assessment. Prerequisites: 12 hours of psychology including Psch. 230; Psch. 240 or 243 or the equivalents, or consent of the instructor. S

343. Advanced Statistics. 4 hours. The logic of statistical inference. Chi square and other tests of statistical hypotheses, small sample error theory, interval estimates, and introduction to the analysis of variance. Prerequisite: Psch. 243. F

345. Psychometric Applications. 4 hours. Theory of psychological tests and measurement applied to problems of ability and personality testing; opinion sampling; reliability and validity; prediction and selection processes. Prerequisites: 12 hours of psychology including Psch. 243, or the equivalent, or consent of the instructor. S

350. Learning and Conditioning. 4 hours. Methods, results, and interpretation of experimental studies of basic learning processes in animal and human subjects. Prerequisite: Consent of the instructor. F

351. Programmed Learning. 4 hours. Theory and research in the techniques, applications, and results of programmed instruction. Prerequisite: 12 hours of psychology, including Psch. 224 or the equivalent or consent of the instructor. W

352. Motivation. 4 hours. Methods, results, and interpretation of experimental studies of basic motivational processes in animal and human subjects. Prerequisite: Consent of the instructor. W

354. Verbal Behavior and Higher Processes. 4 hours. Methods, results, and interpretations of experimental studies of verbal learning, retention and transfer. Prerequisite: Psch. 252 or consent of the instructor. S

355. Higher Processes. 4 hours. Methods, results, and interpretations of experimental studies of language behavior, problem solving, concept formation, and creativity. Prerequisites: 12 hours of psychology and consent of the instructor. **W**

356. Sensory Processes and Perception. 4 hours. Methods, results, and interpretation of experimental studies of sensory and perceptual processes. Emphasis on vision and audition. Prerequisite: Consent of the instructor. **S**

360. Human Factors. 4 hours. Application of experimentally derived principles of behavior to the design of equipment for efficient use and operation. Sensory and perceptual processes, motor skills, and experimental methodology. Prerequisites: 12 hours of psychology including Psch. 250 and 251 or the equivalents, or consent of the instructor. **S**

362. Physiological Psychology. 4 hours. Methods, results, and interpretation of experimental studies of physiological and neurochemical correlates of learning, motivation, and perception. Laboratory demonstrations and problems. Prerequisite: Consent of the instructor. **S**

370. Systems of Psychology. 4 hours. Critical introductory analysis of major historical systems and current theoretical issues. Prerequisite: 15 hours of psychology with a grade-point average of 4.00 or consent of the instructor. **F**

380. Abnormal Psychology. 4 hours. Forms and determinants of behavior and personality disorders. Prerequisite: 15 hours of psychology with a grade-point average of 4.00 or consent of the instructor. **F**

382. Introduction to Psychological Assessment. 4 hours. Systematic analysis of the nature of psychological tests and their application; introduction to intelligence, achievement, personality, and interest tests. Practice in administration and interpretation. Prerequisites: Psch. 243 or the equivalent and consent of the instructor. **F**

399. Individual Study. 2 to 8 hours. May be repeated. Individual research investigation of a special problem under direction of a staff member. Prerequisites: Psch. 243 and any two of 250, 251, 252, or 318; and consent of the instructor, and permission of the head of the department. **F, W, S, Su**

QUANTITATIVE METHODS

170. Statistics I. 3 hours. The role of statistics in the scientific approach to decision making. Data sources, accuracy, precision. The concepts of average dispersion as applied to samples and universes. Emphasis on modern aids to problem solving. Prerequisites: Math. 110, 111, 112 (or concurrent registration in 112) or the equivalents.

171. Statistics II. 3 hours. The nature and contributions of probability theory to the study of decision making under uncertainty. Probability distributions; sampling distributions. Concept and measurement of precision for pertinent statistics. Non-

parametric statistics and their use in decision making. Prerequisite: QM 170 or the equivalent.

172. Statistics III. 3 hours. Two and higher dimensional consideration, regression analysis, time series, models, precision, strategy. Prerequisite: QM 171 or the equivalent.

370. Multivariate Analysis. 4 hours. Analytical approach to the causes and measurements of variance among variables and attributes. Measures of precision for pertinent statistics. Applications presented through demonstration and practice, including electronic computers. Prerequisite: QM 172 or the equivalent.

371. Survey Research. 4 hours. Applications of sampling theory and methods of planning, conducting, and evaluating surveys for measuring public opinion, consumer attitudes and preferences. Instruments of measurement, sampling design, estimation, sources of error and bias. Case studies with application to actual situations. Prerequisite: QM 172 or the equivalent.

375. Information Systems I. 4 hours. Introduction to the theory and concepts of systems. Classification, deterministic and probabilistic models, Markov chains and Monte Carlo processes, simulation. The model as related to the computer, types of programming, experimentation and evaluation. Prerequisites: QM 172 or consent of the instructor. Math. 194 or 195 is recommended.

376. Information Systems II. 4 hours. Advanced management-information system concepts and designs; their implications for administration and management. A major management system design and evaluation project is an essential part of the course.

RHETORIC

101. Freshman Rhetoric and Composition. 4 hours. Elementary training and practice in the comprehension and expression of written English. W, S, Su, F

102. Freshman Rhetoric and Composition. 4 hours. Elementary training and practice in the comprehension and expression of written English. Prerequisite: Rhet. 101. or consent of the instructor. W, S, Su, F

111. Freshman Rhetoric and Composition, Honors Course. 4 hours. A first-quarter course in rhetoric for students in the freshman core program. Prerequisite: Admission to the core program.

112. Freshman Rhetoric and Composition, Honors Course. 4 hours. A second-quarter course in rhetoric for students in the freshman core program. Prerequisites: Admission to the core program and Rhet. 111. W

133. Principles of Composition. 4 hours. Practice in exposition; emphasis on organization, paragraphing, and sentence structure. Prerequisite: Grade of A or B in Rhet. 102 or consent of the instructor. W, S, Su, F

144. Narrative Writing. 4 hours. Provides practice in the writing of description, narrative sketches, stories. Prerequisites: Grade of A or B in Rhet 102 or consent of the instructor. W, S, Su, F

180. Introduction to Rhetoric. No credit. Restricted to students participating in Experimental Program in Urban Education. Fundamental skills involved in expressive and expository writing and general communication effectiveness.

246. Modern English Grammar. 4 hours. Provides study in definition and meaning; use of dictionaries; grammars; survey of syntax. Prerequisite: Junior standing. W, S, Su, F

251. Business Communication. 4 hours. Study and practice in written informative and/or persuasive communications in business and industry. Prerequisites: Rhet. 101 and 102. W, W, Su, F

RHETORIC FOR FOREIGN STUDENTS

103. English as a Foreign Language. No credit. Intensive review of basic English structure for foreign students inadequately prepared for Rhet. 101. Prerequisites: Reading knowledge of English and ability to understand instructions.

104. English as a Foreign Language. No credit. Continues Rhet. 103. A rapid, intensive review of basic English structure; study of more complicated sentence patterns; practice in oral and written composition. For students who may be inadequately prepared for Rhet. 101. Prerequisite: Rhet. 103 or consent of the instructor. W, S

105. English as a Foreign Language. No credit. Intensive remedial writing for the foreign student in the area of his special difficulties. May be taken concurrently with Rhet. 101. Prerequisite: Rhet. 104 or consent of the instructor. W, S

RUSSIAN

101. Elementary Russian. 4 hours. For students who have had no work in Russian. *Note*: A student must have credit in Russ. 101, 102, and 103 to receive graduation credit in 101. Four additional half hours per week in the language laboratory. W, S, Su, F

102. Elementary Russian. 4 hours. Note: A student must have credit in Russ. 102 and 103 to receive graduation credit in 102. Continues Russ. 101. Four additional half hours per week in the language laboratory. Prerequisite: Russ. 101 or the equivalent. W, S, F

103. Elementary Russian. 4 hours. Continues Russ. 102. Four additional half hours per week in the language laboratory. Prerequisite: Russ. 102 or the equivalent. W, S, F

104. Intermediate Russian. 4 hours. Reading, oral-aural practice, systematic functional grammar. Four additional half hours per week in the language laboratory. Prerequisite: Russ. 103 or the equivalent. **W, S, Su, F**

105. Intermediate Russian. 4 hours. Continues Russ. 104. Four additional half hours per week in the language laboratory. Prerequisite: Russ. 104 or the equivalent. **W, S, F**

106. Intermediate Russian. 4 hours. Continues Russ. 105. Four additional half hours per week in the language laboratory. Prerequisite: Russ. 105 or the equivalent. **W, S, F**

201. Speaking and Writing Russian I. 4 hours. Conversation and composition, systematic grammar, vocabulary development, aural comprehension, pronunciation drill, simple applied phonetics. Prerequisite: Russ. 106 or the equivalent. **F**

202. Speaking and Writing Russian II. 4 hours. Continues Russ. 201. Prerequisite: Russ. 201 or the equivalent. **W**

203. Speaking and Writing Russian III. 4 hours. Continues Russ. 202. Prerequisite: Russ. 202. **S**

204. Corrective Russian Phonetics. 1 hour. May be repeated once for credit. Pronunciation and intonation practice. Prerequisite: Russ. 106 or the equivalent.

215. Main Currents of Russian Thought I. 4 hours. A study of the literary, philosophical, and theological works, from the beginning to 1725; structured to acquaint the student with the main cultural forces that shaped Russian thought and manner. Given in English. Prerequisite: Junior standing or consent of the instructor. **W**

216. Main Currents of Russian Thought II. 4 hours. Continues Russ. 215. Covering the period from 1725 to the October Revolution of 1917. Given in English. Prerequisite: Junior standing or consent of the instructor.

221. Introduction to Modern Russian Literature I. 3 to 4 hours. Early nineteenth century literature; special attention to the major works of Pushkin, Gogol, and Lermontov. Readings and lectures in English; selected readings in the original for Russian language students. Prerequisite: Junior standing or consent of the instructor. **F**

222. Introduction to Modern Russian Literature II. 3 to 4 hours. Late nineteenth century literature; special attention to selected works by the great novelists: Turgenev, Tolstoy, Dostoevsky. Readings and lectures in English; selected readings in the original for Russian language students. Prerequisite: Junior standing or consent of the instructor. **W**

223. Introduction to Modern Russian Literature III. 3 to 4 hours. Early twentieth century literature; special attention to works by Chekhov, Bunin, Gorky, Sholokhov, Pasternak, and others. Readings and lectures in English; selected readings in

the original for Russian language students. Prerequisite: Junior standing or consent of the instructor. S

229. Independent Study. 1 to 3 hours. May be repeated for credit. Prerequisites: Russ. 106 or the equivalent and permission of the department.

292. The Structure of Serbo-Croatian. 4 hours. Serbo-Croatian phonology, morphology, and syntax presented as a background and basis for comparison of the East Slavic and South Slavic branches of the Slavic languages. Su

301. Writing and Speaking Russian IV. 3 hours. Continues Russ. 203. Prerequisite: Russ. 203 or the equivalent.

302. Writing and Speaking Russian V. 3 hours. Continues Russ. 301. Prerequisite: Russ. 302 or the equivalent.

331. The Teaching of Russian in the Secondary School. 3 hours. Modern techniques in the teaching of Russian, including the language laboratory. Prerequisites: Russ. 203 and one course in Russian Literature.

SOCIOLOGY

100. Introduction to Sociology. 4 hours. Analysis and description of the structure and dynamics of human society. The application of scientific methods to the observation and analysis of social norms, groups, intergroup relations, social change, social stratification, and institutions. S, Su, W

130. Society and Individual Development. 4 hours. Credit is not given for Soc. 130 if the student has credit in Psch. 115. Social psychology: role theory, influence of language in personality development and social behavior. Prerequisite: Soc. 100. S, W

131. Social Problems. 4 hours. Sociological aspects of some of the more important modern social problems; social interrelationships and culture conflicts involved in their genesis, significance, and amelioration or prevention. Prerequisite: Soc. 100. S, Su, W

185. Introduction to Social Science Research Methods. 4 hours. Same as Geog. 185. The application of statistical methods in social science. Topics include research design and the role of statistics in sociological investigation, measures of central tendency and dispersion, simple correlation techniques, contingency analysis, interpretation of survey findings, and introduction to statistical inference. One hour per week of laboratory work in data analysis. Prerequisite: Soc. 100. S, W

215. Collective Behavior. 4 hours. Introduction to noninstitutional forms of group life; diffuse collectivities, the dynamics of crowds, social movements, revolution, public opinion and propaganda; the relationship of collective behavior to social change, techniques for analyzing collective phenomena. Prerequisite: Soc. 100. S

225. Racial and Cultural Minorities. 4 hours. Sociological and social-psychological analysis of racial, religious, or other ethnic groups; consideration of some of the historical and current social problems resulting from their relationships in society. Prerequisite: Soc. 100. S, Su, W

246. The Sociology of Religion. 4 hours. Analysis of the structures and functions of religious institutions, particularly as found in modern society. Special attention to the interplay between religion and other social phenomena such as economics and politics; the social-psychological aspects of religious behavior; current trends in religious institutions. Prerequisite: Soc. 100. S

262. Sociological Analysis I. 4 hours. Fundamental procedures of social research and their application to sociological problems. Critical analysis of current research in sociology. Laboratory practice in research procedures. Prerequisite: Soc. 185. W

263. Sociological Analysis II. 4 hours. Continues Soc. 262. Analysis and interpretation of sociological data. Introduction to multivariate analysis, scale construction, sociometric analysis. Critical analysis of special problems in sociology. Laboratory practice in research procedures. Prerequisite: Soc. 262. S

271. Population Dynamics. 4 hours. The composition, growth, and/or decline, and movement of human populations. Consideration of the social and cultural factors responsible for these changes, their consequent effects on social life. Prerequisite: Soc. 185 or Psch. 243 or consent of the instructor. Su, W

276. The Sociology of Urban Life in Industrial Society. 4 hours. Life conditions in the modern city as they are affected by the institutions in a rapidly changing industrial society. Prerequisite: Soc. 100. S, W

287. Senior Seminar I. 2 hours. No credit given in Soc. 287 until completion of 288. Students will report to the seminar on current research and developments among sociologists and will submit to questions, criticism, and evaluation of their reports. Prerequisites: Sociology major, senior standing, and all-University 4.00 average.

288. Senior Seminar II. 2 hours. Students will report to the seminar on current research and developments among sociologists and will submit to questions, criticism, and evaluation of their reports. Prerequisite: Soc. 287. S

299. Honors Course. 2 to 6 hours. May be repeated with departmental permission. Individual study or research projects. Prerequisites: Major in sociology, senior standing, all-University 4.00 average and permission of the department. S, Su, W

315. Advanced Social Psychology. 4 hours. Critical analysis of empirical research on social perception, communication and influence, group structure, role analysis, and socialization processes. Individual projects are required. Prerequisites: Soc. 185 or Psch. 243 and 16 hours in sociology or psychology. S

317. Social Psychology of Theater. 4 hours. Same as Soc. 317. Compares social psychological theories which are explicitly dramaturgical and theories of drama

which are explicitly social. Considers dramatic works as social psychological events. Prerequisite: Soc. 130 or Psch. 115 or consent of the instructor.

331. **Criminology. 4 hours.** The nature and extent of crime in American society; assessment and evaluation of the various factors and influences that lead to criminal behavior; various measures proposed for the control of criminal behavior. Prerequisite: 8 hours of sociology. S, W

332. **Juvenile Delinquency. 4 hours.** Various conceptions of the nature of juvenile delinquency and its causes; the juvenile-court movement; juvenile detention, treatment of juvenile offenders; delinquency control programs. Prerequisite: Soc. 331. S, W

335. **Organized Crime in the United States. 4 hours.** The development of organized crime from the first recorded beginnings in early French and English metropolitan areas to its present position and operation in the United States. Detailed consideration of the social, political, and economic conditions which gave rise to the initial appearance of the Mafia in Sicily and its eventual spread and expansion in America; attempted analysis of the political and social implications of organized crime in a democracy. Prerequisite: Soc. 331. S

339. **Correctional Institutions and Methods. 4 hours.** The role of the custodial and correctional institutions used in treatment of the criminal; attempted analysis of their effectiveness in rehabilitating the criminal and preventing crime. The philosophy of management and operation, the classification and consultative processes used in the various types of institutions. Prerequisite: Soc. 331.

341. **Social Stratification and Classes. 4 hours.** Nature and systems of differentiation and ranking in societies, emphasis on the class structure in the United States; life chances, prestige, status, power, and social mobility in the United States and other societies. Prerequisite: Soc. 263 or consent of the instructor. Su, W

343. **Sociology of Education. 4 hours.** The relationship of the educational system to the social structure, major emphasis on the role of education in an advanced technological society. Prerequisite: 8 hours of sociology.

344. **Industrial Sociology. 4 hours.** Analysis of industrial society and industrial institutions; the meaning of work and work relations and of the relationship between work and authority, with cross-cultural emphasis; sociological analysis of collective bargaining and of the impact of industrial and labor organizations on the community and on society. Prerequisite: 8 hours of sociology.

345. **The Sociology of the Family. 4 hours.** The family as a social institution; its origin, its nature of kinship, its development, and its prospects. Prerequisite: 8 hours of sociology. W

346. **Sociology of Science. 4 hours.** Organization of the scientific enterprise; emergence of science as a social institution; interrelations with other institutions such as government, religion, economy, and the arts. Science as a social phenomenon;

regularities in scientific behavior; consideration of both historical and contemporary material. Prerequisite: 8 hours of sociology.

347. Sociology of Complex Organizations. 4 hours. Characteristics of business, government agencies, schools, hospitals, and other large-scale organizations, approaches used to study organizations; theoretical and empirical analysis of organizational processes. Prerequisites: Senior standing and 8 hours of sociology, or consent of the instructor. S, W

348. Military Institutions in American Society. 4 hours. Analysis of military institutions as components of the larger society; recruitment and socialization processes, behavior patterns in military organizations, paramilitary groups, and patriotic societies. Prerequisite: 12 hours of sociology or political science. S

351. Medical Sociology. 4 hours. Sociological contributions to medicine and public health; social organization and the organization of health services; the sociology of illness. Prerequisites: Senior standing and 8 hours of sociology. S

361. Social Gerontology: Old People in America. 4 hours. The aged: demographic trends, economic status, physical and social needs, family relationships. Prerequisites: Senior standing and 8 hours of sociology.

365. The Sociology of Politics. 4 hours. Sociological interpretation of leadership, citizen participation, and the development of political organizations, using comparative materials from the United States and other countries. Prerequisites: 12 hours of sociology or consent of the instructor. S

366. Community Power Structure. 4 hours. Analysis of the power structure of American communities; special emphasis on the relation between theoretical assumptions and research procedures in current community studies. Prerequisite: 12 hours of sociology or consent of the instructor.

372. Methods of Demographic Study. 4 hours. Techniques for measurement of demographic variables such as migration, fertility, mortality; their application in population analysis. Prerequisites: Soc. 263 and 271. S

373. Human Ecology. 4 hours. The relationship between man and the natural environment. Emphasis on the importance of population patterns and human institutions in adaptation. Prerequisite: Soc. 271 or consent of the instructor. W

374. Demographic Analysis. 4 hours. Detailed analysis of basic information concerning quantitative, qualitative, and distributive aspects of population; changes in these characteristics and their causes; implications of anticipated future changes. Prerequisites: Soc. 263 and 271.

376. Urban Sociology. 4 hours. Review and analysis of recent research on urban areas, including their social organization, culture and subcultures, institutions, and contemporary problems. Prerequisites: Soc. 263 and 276. W

385. History of Sociological Theory. 4 hours. The major theoretical systems that have developed in the field, beginning with the foundations in philosophical and

scientific thought before Comte and proceeding to some of the contemporary representatives in the field. Prerequisite: Soc. 263 or 8 hours of sociology.

389. Independent Study. 2 to 12 hours. Supervised study projects for graduate students and honors undergraduates; may consist of extensive readings in specialized areas of sociology or empirical research. Prerequisites: Soc. 263, 20 hours of sociology, and permission of the department. **S, Su, W**

SPANISH

101. Elementary Spanish. 4 hours. For students without credit in Spanish. *Note*: A student must have credit in Span. 101, 102 and 103 to receive graduation credit in 101. Oral practice, reading, and grammar. Two additional half hours per week in the language laboratory. **W, S, Su, F**

102. Elementary Spanish. 4 hours. *Note*: A student must have credit in Span. 102 and 103 to receive graduation credit in 102. Continues Span. 101. Two additional half hours per week in the language laboratory. Prerequisite: Span. 101 or the equivalent. **W, S, Su, F**

103. Elementary Spanish. 4 hours. Continues Span. 102. Two additional half hours per week in the language laboratory. Prerequisite: Span. 102 or the equivalent. **W, S, Su, F**

104. Intermediate Spanish. 4 hours. Rapid reading, grammar review, composition, conversation. Four additional half hours per week in the language laboratory. Prerequisite: Span. 103 or two years of high school Spanish. **W, S, Su, F**

105. Intermediate Spanish. 4 hours. Continues Span. 104. Prerequisite: Span. 104 or the equivalent. **W, S, Su, F**

106. Intermediate Spanish. 4 hours. Continues Span. 105. Prerequisite: Span. 105 or the equivalent. **W, S, Su, F**

115. Elementary Composition and Conversation. 2 hours. Difficulty level: Span. 104 through 106. May be taken concurrently with Span. 105 or 106. Does not count toward the major in Spanish. Prerequisite: Span. 104 or two years of high school Spanish.

211. Intermediate Composition and Conversation. 3 hours. Prerequisite: Span. 106 or four years of high school Spanish. **W, S, Su, F**

212. Intermediate Composition and Conversation. 3 hours. Continues Span. 211. Prerequisite: Span. 211 or the equivalent. **W, S, F**

213. Intermediate Composition and Conversation. 3 hours. Continues Span. 212. Prerequisite: Span. 212 or the equivalent. **W, S, F**

214. Advanced Composition and Conversation. 3 hours. Prerequisite: Span. 213 or the equivalent. **Su, W, S, F**

215. Advanced Composition and Conversation. 3 hours. Continues Span. 214. Prerequisite: Span. 214 or the equivalent. W, S, F

216. Advanced Composition and Conversation. 3 hours. Continues Span. 215. Prerequisite: Span. 215 or the equivalent. W, S, F

217. Spoken Spanish. 3 hours. Intensive course. Exclusively oral-aural. Prerequisite: Span. 213 or the equivalent.

218. Spanish Literature to 1700. 3 hours. Highlights of Spanish literature from its beginning through the seventeenth century. Prerequisite: Span. 106 or the equivalent. Su, S, F

219. Spanish Literature to 1900. 3 hours. Continues Span. 218. Prerequisite: Span. 218. W

221. Drama and Poetry of the Twentieth Century. 3 hours. The nature of contemporary Spanish drama and poetry. Reading of representative works by A. Machado, Garcia Lorca, J.R. Jimenez, Aleixandre, Benavente, Martinez Sierra, Buero Vallejo, and others. Prerequisite: Span. 106 or four years of high school Spanish. S, F

222. Drama and Poetry of the Twentieth Century. 3 hours. Continues Span. 221. Prerequisite: Span. 221. W, F

223. Spanish-American Fiction of the Twentieth Century. 3 hours. Readings in contemporary Spanish-American novelists and short story writers. Prerequisite: Span. 106 or four years of high school Spanish. F

224. Spanish-American Fiction of the Twentieth Century. 3 hours. Continues Span. 223. Prerequisite: Span. 223. W

231. Commercial Spanish. 3 hours. A general course in the use of Spanish in commercial correspondence and in other areas of the business world: business-letter writing, orders, invoices, banking, standard abbreviations. Prerequisite: Span. 106 or four years of high school Spanish.

240. Spanish Literature in Translation. 3 hours. Not open to majors or minors in Spanish nor to anyone with credit in Spanish courses above 200 level. The major works from the *Cid* to the end of the nineteenth century. Prerequisite: Sophomore standing or consent of the instructor. F

241. Spanish Literature in Translation. 3 hours. Not open to Spanish majors and minors nor to anyone with credit in Spanish courses above 200 level. Major works from 1898 to the present. Prerequisite: Sophomore standing or consent of the instructor. W

242. Spanish-American Literature in Translation. 3 hours. Not open to Spanish majors and minors nor to anyone with credit in Spanish courses above 200 level. Major works from the beginning of Spanish-American literature to the present,

with special emphasis on the nineteenth and particularly the twentieth century. Prerequisite: Sophomore standing or consent of the instructor. S

280. **Teachers Course. 3 hours.** A survey of resources, classroom materials, standard practices, instruction and practice in the audiovisual and language laboratory techniques; problems in the teaching of Spanish. Practical application to actual classroom situations. Prerequisites: Span. 211, 212, and 213; or 221 and 222; or 223 and 224. W, F

218. **Teachers Course. 3 hours.** Continues Span. 280. Prerequisite: Span. 280. S

291. **Senior Thesis. 2 hours.** May be repeated for a maximum of 6 hours. For candidates for honors in Spanish. Prerequisite: Honors status.

299. **Independent Study. 1 to 6 hours.** Open only to Spanish majors. Prerequisite: Consent of the instructor. W, S, F

305. **Romanticism and Realism in Nineteenth Century Spanish Literature. 3 hours.** Representative outlines and genres of the nineteenth century, with particular emphasis on the romantic drama and the realistic novel. Prerequisites: Span. 221 and 222 or the equivalents. F

306. **Romanticism and Realism in Nineteenth Century Spanish Literature. 3 hours.** Continues Span. 305. Prerequisite: Span. 305.

307. **The Generation of 1898. 3 hours.** Representative works of Baroja, Azorin, Unamuno, Maeztu, Valle Inclan, Benavente, A. Machado, and others. Prerequisites: Span. 221 and 222 or the equivalents.

308. **Spanish-American Literature to 1888. 3 hours.** The development of Spanish-American literature from the sixteenth century through the end of the Romantic period. Prerequisites: Span. 223 and 224 or the equivalents. S

309. **Spanish-American Literature to 1888. 3 hours.** Continues Span. 308. Prerequisite: Span. 308. F

310. ***Modernismo* and Contemporary Spanish-American Poetry. 3 hours.** Spanish-American poetry from 1888 to the present with some *Modernista* prose. Prerequisites: Span. 223 and 224 or the equivalents.

311. ***Modernismo* and Contemporary Spanish-American Poetry. 3 hours.** Continues Span. 310. Prerequisite: Span. 310. W

312. **Don Quijote and Prose of the Golden Age. 3 hours.** Includes Celestina, Lazarillo, *novelas ejemplares,* Queredo, and other material. Prerequisites: Span. 221 and 222 or the equivalents. S

313. **Don Quijote and Prose of the Golden Age. 3 hours.** Continues Span. 312. Prerequisite: Span. 312. F

314. Drama and Poetry of the Golden Age. 3 hours. Special attention is given to the romances and the chief poets of the sixteenth century. Prerequisites: Span. 221 and 222, or 223 and 224, or 305 and 306, or 308 and 309, or the equivalents.

315. Drama and Poetry of the Golden Age. 3 hours. Continues Span. 314. Prerequisite: Span. 314. W

320. The Contemporary Spanish Novel. 3 hours. The novel as it has developed since 1936. Prerequisites: Span. 221 and 222 or the equivalents.

321. The Contemporary Spanish Novel. 3 hours. Continues Span. 320. Prerequisite: Span. 320. W

323. The Contemporary Spanish-American Novel. 3 hours. The prose development from the Romantic period to 1930. Prerequisites: Span. 223 and 224 or the equivalents.

324. The Contemporary Spanish-American Novel. 3 hours. Continues Span. 323. The period from 1930 to the present. Prerequisites: Span. 223, 224, and 323.

331. *La Cultura Hispanica: Espana.* 3 hours. A consideration of the cultural aspects of Spanish civilization. Prerequisites: Span. 221 and 222, or 223 and 224, or the equivalents. S

332. *La Cultura Hispanica: Hispanoamerica.* 3 hours. A consideration of cultural aspects of Spanish-American civilization. Prerequisites: Span. 221 and 222, or 223 and 224, or the equivalents. F

340. History of the Spanish Language. 3 hours. A general survey of the development of the Spanish language. Prerequisites: Span. 213 and 218 or the equivalents.

341. Medieval Spanish Literature. 3 hours. The important works from the *Poema del Cid* to 1499. Prerequisites: Span. 218 and 219.

350. Phonetics. 2 hours. Prerequisites: Span. 221 and 222, or 223 and 224, or the equivalents. Su, W

351. Phonetics. 2 hours. Continues Span. 350. Prerequisite: Span. 350.

352. Syntax. 2 hours. Prerequisites: Span. 221 and 222, or 223 and 224, or the equivalents. W, F

353. Syntax. 2 hours. Continues Span. 352. Prerequisite: Span. 352. S

371. Spanish for Teachers. 3 hours. A consideration of those language problems suggested by teaching experience. It is recommended that this course be taken after student teaching, in the last quarter before graduation. Also open to experienced teachers. Prerequisites: Span. 221 and 222, or 223 and 224, or the equivalents.

SPEECH AND THEATRE

101. Principles of Effective Speaking. 5 hours. Preparation and presentation of short speeches; emphasis on the selection, organization, and support of ideas. **F, W, S, Su**

102. Principles of Effective Speaking. 4 hours. Prerequisite: James Scholar or Dean's List status or speech major or consent of the department.

107. Parliamentary Procedure. 2 hours. Principles and practice. **F, W, S, Su**

111. Foundations of Communication Theory. 4 hours. The development of communication theory from Plato and Aristotle to the twentieth century. Consideration of concepts, including relationships between societal needs and communication theory, free speech, development of parliamentary institutions, and fundamental communication principles. **F, W, S**

112. Interpersonal Communication Theory. 4 hours. Experimentally derived theories of communication. Communication models, information theory, field theory, channels, feedback, and cognitive dissonance. **F, W, S**

113. Mass Communications Theory. 4 hours. The nature of mass communications, with particular consideration of major concepts, including communication technology and societal change, information transmission and diffusion, content analysis and the measurement of effects, the institutionalization of mass communications, freedom and responsibility in public and private channels, and the relationship of mass communications to mass culture. **W, S**

121. Introduction to the Theatre. 4 hours. The nature and elements of theatre—the theories, styles, and semantics of theatre arts. **F, W, S, Su**

122. Survey of Theatre History. 4 hours. An introduction to the major historical periods in the development of the theatre and drama from ancient Greece to the present. Prerequisite: Spch. 121. **W, S**

123. Contemporary Theatre. 4 hours. Critical and analytical study of current theatre productions. Students will attend and analyze several currently produced plays in the Chicago area. Critical analysis based upon modern literary, production, and performance standards. Prerequisite: Spch. 121. **F, W, S**

131. Introduction to Television and Radio, Performance and Production. 2 hours. Introduction to the knowledge and skills required to adapt oral and written communications for presentation on television and radio. Special attention to the basic equipment and terminology involved. Lecture and laboratory. **F**

141. Oral Interpretation of Literature. 4 hours. Oral reading for understanding, appreciation, and communication. **F, W, S, Su**

151. Introduction to Technical Theatre. 4 hours. A lecture-laboratory approach to the basic techniques of play production. Survey of historical background and sources, theories, styles, methods and materials of scene design, stage lighting,

costuming, and makeup. Lectures, readings, and practical problems. Prerequisite: Spch. 121. **F**

171. Principles of Speech Development and Correction. 4 hours. An introductory course that considers the development, role, and structure of language. Designed to assist the teacher in identifying and recognizing the child handicapped in speech and language. Discussion of the nature, causes, and therapeutic methods for such handicaps. Clinical observations. **F, S**

195. Advanced Voice Training. 3 hours. Designed to develop in the individual student's voice a wide range of controls in pitch, volume, and quality to meet extraordinary voice and speech demands in broadcasting, interpretation, public address, teaching and theatre. Prerequisite: Voice proficiency test, to be administered by the instructor. **W**

201. Bases of Speech. 4 hours. The social, physical, physiological, neurological, phonetic, linguistic, psychological, genetic, and semantic bases of speech. **W**

202. Fundamentals of Phonetics. 4 hours. Phonemics and phonetics; emphasis on pronunciation characteristics of American English, ear training, and practice in transcription. **F, S**

203. Anatomy and Physiology of the Speech Mechanism. 4 hours. Anatomical and physiological characteristics of the normal speech-and-hearing mechanisms; physiology of speech production. Prerequisite: Spch. 201 or 202 or consent of the instructor.

204. Speech Science. 4 hours. Voice and speech as related to the physiology of the speech act, acoustics, and the hearing of speech. Prerequisite: Spch. 201 or 202 or consent of the instructor.

211. Discussion. 4 hours. Study and practice in the theories and techniques of group discussion; the nature of small-group decision making; discussion as a learning technique. Prerequisite: Spch. 112. **S**

212. Argumentation. 4 hours. The theory of argumentation; evidence, reasoning, and refutation; historical and contemporary debates and argumentative discourse; practice in argumentative speaking. **F**

213. Persuasion. 4 hours. Principles of attitude change, including theories of persuasion and audience analysis. Practice and experimentation in persuasive speaking. Prerequisites: Spch. 111, 112, and 113; or 215; or consent of the instructor. **W, Su**

215. Psychology of Attitude and Opinion. 5 hours. Same as Psch. 215. Survey of behavioral approaches to the measurement of social attitudes and opinions; determinants and correlates of public attitudes and opinions. Lecture and participation in field and laboratory studies. Prerequisite: 8 hours of psychology or consent of the instructor for well-qualified speech majors. **F**

231. **Television and Radio Performance. 4 hours.** Development of the basic skills for effective dramatic and nondramatic television and radio performance; announcing, interviewing, and acting. Special attention is given to individual performance problems. Lecture and laboratory. Prerequisites: Spch. 113 and 131 or consent of the instructor. **F**

232. **Television and Radio Production. 4 hours.** Lecture and laboratory eourse designed to teach advanced production techniques for radio and television. Students are exposed to a variety of radio and television production situations. Prerequisite: Spch. 131 or consent of the instructor. **W**

233. **Television and Radio Directing. 4 hours.** Designed to develop style and skill in television and radio directing, with special attention to script analysis, staging, pictorial composition, audio placement and integration, control room operation, crew management, and rehearsal procedures. Prerequisite: Spch. 232. **S**

239. **Mass Communication Practicum. 5 hours.** Professional studies in the mass media. Students work in Chicago area radio and television stations. The nature of work is determined in consultation with the department and the station involved. Limited to a few advanced students in mass communications on the basis of written applications submitted one quarter in advance. Prerequisite: Approval of the head of the department.

241. **Advanced Oral Interpretation. 4 hours.** Literary analysis of poetry, prose, and drama; platform presentation of literary materials. Prerequisite: Spch. 141. **W, S, Su**

251. **Advanced Technical Theatre. 4 hours.** Advanced techniques of play production. Fundamentals of scene design, lighting, and costuming, such as illusion techniques, ornamentation, use of color, and techniques of rendering, plotting, and sketching. Practical work with University Theatre. Prerequisites: Spch. 121 and 151. **W**

261. **Fundamentals of Acting. 4 hours.** Methods of acting, with emphasis on basic stage techniques and the role of the character in relation to the intellectual and emotional values of the play. Prerequisites: Spch. 121 and 141 or consent of the instructor. **F**

262. **Advanced Acting. 4 hours.** Study and practice of modern realistic and nonrealistic acting techniques. Development and performance of a full-length characterization. Prerequisite: Spch. 261 or consent of the instructor. **W**

264. **Fundamentals of Stage Directing. 4 hours.** Principles and techniques of the director's art. Fundamentals of staging: blocking, movement, business, tempo; script analysis and rehearsal planning. Specific projects in directing scenes. Prerequisites: Spch. 121 and 261. **W**

265. **Advanced Stage Direction. 4 hours.** Study of procedures for developing a creative relationship between director and actor in interpreting a play in rehearsal; historical consideration of directorial methods. Class analysis of problems of in-

terpretation and stage management; assignment of scenes to demonstrate dramatic values. Prerequisite: Spch. 264. **S**

295. Secondary School Speech Curriculum. 4 hours. Designed to equip the prospective speech teacher with the objectives, principles, and methods of teaching speech arts in the secondary school. Prerequisite: Junior standing and 16 hours of speech courses.

298. Honors Course: Individual Study. 3 hours. May be repeated for a maximum of 6 hours. Individual study leading to a thesis to complete requirements for distinction in the Department of Speech and Theatre. Prerequisites: 4.000 grade-point average, 24 hours of speech and theatre, and consent of the head of the department. **F, W, S**

299. Individual Topics. 3 hours. May be repeated for a maximum of 6 hours. Individual investigation of special problems. Prerequisites: 10 hours of speech, 3.750 grade-point average, and consent of the head of the department. **F, W, S**

301. Information Exchange and Analysis. 4 hours. Descriptions, models, proposed dimensions, and mathematical treatment of the information exchange process. Prerequisites: Spch. 111, 112, and 113. **F**

302. Group Communication Theory. 4 hours. Detailed analysis and observation of group processes from the viewpoint of modern information and field communication theory. Prerequisites: Spch. 111, 112, and 113.

303. Theories of Language Performance. 4 hours. W

311. American and British Public Address I. 4 hours. A critical and historical study of American and British speakers and their speeches to 1850. Prerequisite: Junior standing. **S**

312. American and British Public Address II. 4 hours. Continues Spch. 311; from 1850 to 1920. Prerequisites: Spch. 111, 112, and 113 or consent of the instructor. **F**

313. Contemporary Public Address. 4 hours. Speechmaking, with the principal focus on issues relating to economics and government, World War II, postwar international problems, and civil rights. Prerequisites: Spch. 111, 112, and 113 or consent of the instructor. **W**

317. Social Psychology of Theater. 4 hours. Same as Spch. 317. Compares social psychological theories which are explicitly dramaturgical and theories of drama which are explicitly social. Considers dramatic works as social psychological events. Prerequisite: Soc. 130 or Psch. 115 or consent of the instructor.

321. European Theatre History I. 4 hours. Historical survey of the theatre and theatre arts of ancient Greece, Rome, medieval Europe, the Italian Renaissance, and Elizabethan England. Prerequisite: Spch. 112 or consent of the instructor. **W**

322. **European Theatre History II. 4 hours.** Historical survey of the theatre and theatre arts from the seventeenth century to modern times in Europe and England. Prerequisite: Spch. 122 or consent of the instructor. **S**

324. **American Theatre History. 4 hours.** Development of the American theatre from 1700 to 1914; historical trends and dramatic literature. Prerequisite: Spch. 122 or consent of the instructor.

325. **American Theatre History II. 4 hours.** Development of the American theatre from 1914 to the present; native and European influences in determining theatrical trends. Prerequisite: Spch. 122 or consent of the instructor. **F, Su**

327. **Playwriting. 4 hours.** An introductory course in the writing of drama as a distinctive mode of expression intended for theatrical performance. Study of the nature of the theatrical experience and dramatic action through the basic elements of plot, character, theme, dialogue, mood and spectacle. Specific writing exercises and satisfactory completion of an original one-act play. Prerequisites: Junior standing and Spch. 121, 122, and 123 or consent of the instructor.

328. **Theories of Play Production. 4 hours.** Seminar emphasizing the stage director's central function in creating an artistic concept for producing a play and coordinating all elements of performance in an aesthetic unity. Historical research of a recognized dramatic classic and preparation of a complete production book. Prerequisites: Spch. 251, 264, and 265, or consent of the instructor.

329. **Theatrical Criticism. 4 hours.** Seminar in the study and practice of theatrical criticism, principally modern and contemporary criticism. Historical bases of critical judgment of play and performance; function and influence of the critic in establishing artistic standards and cultivating public taste. Preparation of criticisms of current productions. Prerequisite: Junior standing and Spch. 121, 122, and 123, or consent of the instructor. **W**

331. **Mass Media Programming. 4 hours.** Mass media program types, objectives, methods, and effects. The creative development of programs from conception to script. **F**

332. **Projects and Problems in Mass Media. 4 hours.** Each student plans and executes an individual project of substantial dimensions in television, radio, motion pictures, magazines, or newspapers. The project culminates in a research paper. **W**

333. **Mass Communication Seminar. 4 hours.** Intensive study of theories of mass communication: authoritarian, libertarian, communistic, and social responsibility as applied to radio, television, the press, and motion pictures. Extensive study of the dynamic process nature of mass media in contemporary society. Prerequisite: Spch. 113. **S**

351. **Scene Design and Lighting. 4 hours.** A lecture-laboratory approach to the role stage lighting plays in scenic design. Analysis of historical background and sources with special emphasis on areas such as theories, psychological and aesthetic factors, and lighting application techniques and equipment. Lectures, readings, and practical problems. Prerequisite: Spch. 251. **S**

361. Periods and Styles of Acting. 4 hours. Concentration on pre-modern styles of acting from these periods: classic Greece, *commedia dell' arte*, Elizabethan, Restoration and eighteenth century, nineteenth century melodrama, and naturalism. Prerequisites: Spch. 261 and 262. S

SPEECH FOR FOREIGN STUDENTS

103. Speech for Foreign Students. No credit. Sounds and intonation patterns of American English; relation of sound to spelling. Drill sessions designed to improve the student's ability to speak and understand English at normal conversational speed. Prerequisites: Ready knowledge of English; ability to understand instructions.

104. Speech for Foreign Students. No credit. English pronunciation for students whose native language is not English. Sounds and intonation patterns of American English; designed to improve the student's ability to speak at a normal conversational pace. Pronunciation material similar to that in Spch. 103 but for more advanced students. Prerequisite: Spch. 103 or consent of the instructor.

STUDENT COUNSELING SERVICE

101. Reading Improvement. No credit. For students who wish to increase their reading rate or improve their vocabulary and comprehension skills.

102. Study Skills Improvement. No credit. For students who need to develop more effective study methods. Through discussion and group interaction, students are helped to clarify their purposes and goals and to improve concentration and study skills.

103. Vocabulary Development. No credit. For students who need assistance in developing language skills. Use of vocabulary in thinking and communication. Practical exercises in vocabulary building.

104. Career Planning. No credit. For students who wish to clarify their vocational goals. Self-evaluation of abilities, interests, and personal needs as they bear on occupational choice.

180. Reading and Study Skills Improvement. No credit. Restricted to students enrolled in the Experimental Program in Urban Education. Learning process of retention, forgetting, memory, and distribution of practice. Understanding of and initial practice of improved methods of reading and study; elimination of ineffective habits; intensive application of new procedures; and evaluation. Prerequisite: Consent of the instructor.

SYSTEMS ENGINEERING

103. Engineering Graphics I. 4 hours. Spatial relations of points, lines, and planes.

Graphic analysis and computations, with analytical proofs. Vector geometry, multiviews, orthographic projections, standard of measurements, nonprojective drawings (technical charts). Conceptual and creative design and computer-related graphics. Prerequisite: Registration in Math. 104 and/or 105 or the equivalents.

104. **Engineering Graphics II. 4 hours.** Spatial relations of planes and solids. Graphic analysis and computations with analytic proofs. Vector geometry, graphical mathematics, including graphical algebra. Graphics in communications—standards of measurements and geometric and positional tolerancing and technical charts. Conceptual and creative design and computer-related graphics. Prerequisites: SysE. 103 and registration in Math. 130.

151. **Introduction to Engineering Design I. 4 hours.** The design approach, modeling, free body diagrams and equilibrium of forces; orthographic projection, design problems. Prerequisite: Registration in Math. 130.

152. **Introduction to Engineering Design II. 4 hours.** Continues SysE. 151. Equilibrium of moments, descriptive geometry, selected topics from combinatorial probability, linear programming and communication theory, design problems. Prerequisites: SysE. 151 and registration in Math. 131 and Phys. 111 or the equivalents.

153. **Introduction to Engineering Design III. 4 hours.** Continues SysE. 151 and 152. Economic considerations; topics from probability, communications theory, conservation principles, and dynamics; design problems. Prerequisites: SysE. 152 and registration in Math. 132 and Phys. 112 or the equivalents.

201. **Introduction to System Analysis. 4 hours.** Mathematical modeling of physical elements; mechanical, electrical, fluid, thermal, equilibrium of interconnected elements; integrodifferential equations. Prerequisite: Math. 133 or the equivalent and Phys. 113 or the equivalent.

202. **Introduction to Systems Analysis. 4 hours.** Mathematical modeling of physical elements; mechanical, electrical, fluid, thermal, equilibrium of interconnected elements; integrodifferential equations. Prerequisite: SysE. 201.

203. **Introduction to Systems Analysis. 4 hours.** Mathematical modeling of physical elements; mechanical, electrical, fluid, thermal, equilibrium of interconnected elements; integrodifferential equations. Prerequisite: SysE. 202.

211. **Distributed Parameter Systems. 4 hours.** Mathematical modeling of distributed physical systems: electromagnetic, elastic, fluid, thermal, and acoustic. Introduction to potential, diffusion, and wave equations. Solution by analytic, graphical, and numerical methods. Prerequisite: Registration in SysE. 201 or the equivalent and Phys. 114 or the equivalent.

212. **Distributed Parameter Systems. 4 hours.** Continues SysE. 211. Prerequisites: SysE. 211 and registration in SysE. 202.

213. **Distributed Parameter Systems. 4 hours.** Continues SysE. 212. Prerequisites: SysE. 212 and registration in SysE. 203.

220. Industrial Production Illustration. 4 hours. Mechanical and freehand drawings in axonometric, oblique, and perspective; shades, and shadows; rendering of drawings with various media, including some work with the airbrush. Industrial production illustration. Prerequisite: SysE. 103.

221. Graphical Calculations. 3 hours. Graphics in space flight. Graphical analysis and computations with analytical proofs. Graphical mathematics, including graphical calculus. Graphics of empirical equations. Graphics in communications—technical charts and nomographs. Conceptual and creative design and computer-related graphics. Prerequisite: SysE. 103 or the equivalent and registration in Math. 133.

222. Surveying I. 4 hours. Fundamental operations. Prerequisite: Math. 250.

223. Surveying II. 4 hours. Introduction to precise control surveys and route alignment; elements of aerial photogrammetry. Prerequisite: SysE. 222.

311. Introduction to Systems Analysis I. 4 hours. Mathematical modeling of lumped physical elements: electrical, mechanical, fluid, and thermal. Transient response of physical systems. Introduction to LaPlace transform. Computer methods of analysis. Prerequisites: Math. 195, 220, and InfE. 210.

312. Introduction to Systems Analysis II. 4 hours. Sinusoidal steady-state response of physical systems: electrical, mechanical, fluid, and thermal. Network theorems. Power and energy. S-plane. Frequency transform. Convolution integral. Analysis of two-port networks. Block diagrams. Prerequisite: SysE. 311.

313. Introduction to Systems Analysis III. 4 hours. Signal flow graphs. Systems with feedback. Stability considerations. Routh-Hurwitz test. Bode diagrams. Nyquist criterion. Introduction to nonlinear systems analysis. Prerequisite: SysE. 312.

321. Distributed Parameter Systems I. 4 hours. Mathematical modeling of distributed physical systems: electromagnetic, elastic, fluid, thermal, and acoustic. Introduction to potential, diffusion, and wave equations. Solution by analytical, graphical, and numerical methods. Prerequisites: EnrE. 211 and credit or registration in SysE. 311.

322. Distributed Parameter Systems II. 4 hours. Continues SysE. 321. Prerequisite: SysE. 321.

323. Distributed Parameter Systems III. 4 hours. Continues SysE. 322. Prerequisite: SysE. 322.

350. Stochastic Processes. 4 hours. Probability models, queueing theory, game theory, and related topics. Prerequisite: Math. 370.

371. Optimization Techniques I. 4 hours. Programming methods: linear, dynamic, and nonlinear. Prerequisites: Math. 195, 220, and senior standing, or consent of the instructor.

372. **Optimization Techniques II. 4 hours.** Gradient methods. Pontryagin's maximum principle. Calculus of variations and related topics. Prerequisite: SysE. 371.

391. **Seminar. 1 to 4 hours.** Topics to be arranged. Prerequisite: Consent of the instructor.

392. **Undergraduate Research.** 2 to 4 hours. Research under the close supervision of a faculty member. Prerequisite: Consent of the instructor.

393. **Special Problems. 2 to 4 hours.** Special problems and reading by special arrangement with the faculty. Prerequisite: Consent of the instructor.

Index

Academic Regulations, 35
Accounting
  courses in, 177
  specialization in, 81
ACT, 60
  advanced placement credit for, 59
Administration of Criminal Justice, 51
  courses in, 178
  criminal justice core, 140
  major in, 140
Admission
  with advanced standing, 56
  credit from other institutions, 56
  program of progressive, 55
  by special action, 54
Admission Procedures, 60
  beginning freshmen, 60
  readmission applicants, 61
  transfer applicants, 61
Admission Requirements
  beginning freshmen, 44
  readmission applicants, 47
  substitutions and exemptions, 54
  transfer students, 46
  for undergraduate study, 49-53
Admission to Undergraduate Study, 49-53
Advanced Placement Program, Credit Through, 57
Aerospace Science Major, 107
American College Test
  admission requirement, 60
  advanced placement credit for, 59
Anthropology
  courses in, 180
  departmental distinction in, 141
  general education sequences in, 137
  major in, 141
  minor in, 141
Applied Mechanics Major, 108
Applied Physics Major, 110
Architecture and Art, College of
  admission requirements, 49
Architecture
  courses in, 183
  curriculum in, 69
  Department of, 68
Architecture and Art
  courses in, 187
Art
  courses in, 188
  Department of, 73
  foundation program in, 74
  major in art history, 75
  major in design, 75
  major in plastic and graphic arts, 75
Art History
  courses in, 188
  major in, 75
Athletic Program, 15
Athletics
  intramural and intercollegiate, 171

Bioengineering Major, 111
Biological Sciences
  advanced placement credit in, 58
  courses in, 190
  departmental distinction in, 142
  general education sequence in, 137
  major in, 142
  minor in, 142
Book of Academic Honors, 20
Business Administration, College of
  admission requirements, 50
  areas of specialization, 81
  business core requirements, 78
  general education requirements, 78
  graduation requirements, 78
  typical program in, 80
Business Law, courses in, 195

Calendar
Chicago Circle, 4, 6
Urbana, 5, 7
Cars, 15
Certified Public Accountant
recommended program in preparation for the examination, 83
Change-of-Program Fee, 65
Chemical Engineering Major, 112
Chemistry
advanced placement credit in, 59
courses in, 196
curriculum in for B.S., 144
departmental distinction in, 144
general education sequences in, 137
major in, 144
minor in, 144
teacher education in, 144
Chemistry Curriculum (B.S.), 144
Chicago Circle Campus
Administrative Officers, 10
history of, 13
location, 14
Classics, courses in, 200
Communications Engineering Major, 114
Computer Center, 25
Computer Science Major, 115
Concurrent Registration, 44, 63
Coordinator of Foreign Student Affairs, 43
Correspondence Courses, 15
Counseling, Educational, Vocational, Personal, 35
Credit hour, definition of, 177
Criminal Justice, Administration, of, 51
courses in, 178

Dance, Courses in, 201
Dean of Men, 35
Dean of Student Affairs, 35
Dean of Women, 35
Dean's List, 19
Deferred-Fee Charge, 65
Degrees, Awarding of, 30
Departmental Distinction, 19, 141, 142, 144, 147, 148, 149, 150, 152, 153, 155, 156, 158, 159, 160, 162, 163
Design
courses in, 201
major in, 75
Director of Organizations and Activities, 43
Dual Registration, 44

Economics
courses in, 210
major in, 140
minor in, 141
specialization in, 83
Education, College of
admission requirements, 50, 91
advanced standing requirements, 92
advising program, 91
courses in, 212
elementary schools, curriculum for teaching in, 92
fields of specialization, 94
Illinois State Teachers Certification Requirements, 95
minimum academic requirements for temporary certificate in Chicago Public Schools, 97
secondary schools, curricula preparatory to teaching in, 94
student teaching, 92
Educational Opportunity Grants, 39
Electives, 32
Emergency Aid (Small Loans), 42
Energy Conversion Major, 116
Energy Engineering
courses in, 212
Department of, 100
Engineering, College of
admission requirements, 51
aerospace science, 107
applied mechanics, 108
applied physics, 110
bioengineering, 111
chemical engineering, 112
common core curriculum, 103
communications engineering, 114
computer science, 115
elective courses, 105
energy conversion, 116
foreign language requirement, 105
graduation requirements, 106
humanistic-social science courses and rhetoric, 105

major fields of concentration, 102
and the required courses, 107
manufacturing engineering, 118
mathematics and chemistry
placement tests, 104
mechanical analysis and design, 119
metallurgy, 120
operations research, 122
physical education requirement, 105
soil engineering, 123
structural design, 125
structural mechanics, 126
systems analysis, 127
thermal science, 129
transfer students, 106
water and air resources, 130
wave propagation and radiation, 131
English
advanced placement credit in, 58
courses in, 215
departmental distinction in, 147
general education sequences in, 137
major in, 146
minor in, 147
teacher education in, 147
Entrance Examinations, 54
Extramural (Extension) Courses, 15

Finance
courses in, 223
specialization in, 84
Financial Aid, 14, 37
Foreign Student Affairs, 43
Forestry, 52
45-Hour Rule, 55
French
advanced placement credit in, 58
courses in, 224
departmental distinction in, 148
general education sequence in, 137
major in, 148
minor in, 148
teacher education in, 148
Freshman Core Program, 17
Freshman Guidance Examinations, 35

General Curriculum, L. A. S.
academic majors, 134
admission requirements, 51
majors in, 139-163
General Educational Development
Tests, 54
General Education Requirements
Architecture and Art, 72
Business Administration, 78
Physical Education, 172, 174
General University Officers, 10
General University Requirements, 29
Geography
courses in, 227
departmental distinction in, 149
general education sequence in, 137
major in, 149
minor in, 149
teacher education in, 149
Geology
courses in, 230
departmental distinction in, 150
general education sequence in, 137
major in, 150
minor in, 150
German
advanced placment credit in, 58
courses in, 233
general education sequence in, 137
honors in, 151
major in, 151
minor in, 151
teacher education in, 151
Grade Points, 32
computing average, 32
Grades, University, 31
symbols for, 31
Graduation
with honors, 19
requirements, 29
residence requirement, 30
Greek, courses in, 236

Health Science, Courses in, 237
Health Service, 36
History
advanced placement credit in, 58
courses in, 237
departmental distinction in, 152
general education sequences in, 137
major in, 152
minor in, 152
teacher education in, 152
Home Economics, 51

Honors, Academic, 18
general College, 19
in German, 151
special, 20
Honors, Graduation with, 19
Honors Day Convocation, 19
Honors Program, 16
Freshman Core Program, 17
James Scholars, 16
Hospital-Medical-Surgical
Insurance, 26, 65
Housing, 15
Humanities
advanced placement credit in, 58
courses in, 248
general education sequence in, 137

Illinois Guaranteed Loan Program, 41
Illinois State Teachers Certification
Requirements, 95
Information Engineering
courses in, 248
Department of, 100
Instructional Resources, Office of, 25
Insurance, 26, 65
Intramural and Intercollegiate
Athletics, 171
Italian, courses in, 252

James Scholars, 16, 19
Jane Addams Graduate School of
Social Work, 27
Job Placement, 43
Junior College Credit, 56

Language Laboratory, 252
Late Registration Fine, 65
Latin
advanced placement credit in, 58
courses in, 253
Liberal Arts and Sciences, College of
academic majors, 134
admission requirements, 51, 52
advanced hours, 138
college requirements, 135
curricula offered by the College, 133
department requirements, 138
foreign language requirement, 135
general education sequences, 136
graduation requirements, 135
limitations on courses and hours, 138
majors in, 138
minors in, 138
preprofessional programs in, 134
teacher education in, 134
teaching in secondary schools, 139
transfer credit in general
education, 137
Library, 23
Loans, Loan Funds, 40
Lost Photo-Identification Card Fee, 65

Management
courses in, 255
specialization in, 85
Manufacturing Engineering Major, 118
Marketing
courses in, 256
specialization in, 87
Materials Engineering
courses in, 257
Department of, 101
Mathematics
advanced placement credit in, 59
courses in, 262
credit for high school courses in, 57
departmental distinction in, 153
general education sequences in, 137
major in, 153
minor in, 153
teacher education in, 154
Mechanical Analysis and Design
major, 119
Medical Center
Administrative Officers, 11
Medical Examination, 36, 63
Medical Record Administration,
51, 134, 164
Medical Technology, 51, 134, 165
Metallurgy Major, 120
Military Science, courses in, 269
Military Service
credit for, 57
withdrawal from the University
to enter, 33, 66
Music
courses in, 271
general education sequences in, 137
major in, 154
minor in, 154

Occupational Therapy, 134, 164
admission to curriculum in, 52
Operations Research Major, 122
Orchesis, 171

Permit to Enter, 62
Philosophy
courses in, 274
departmental distinction in, 155
general education sequences in, 137
major in, 155
minor in, 155
Physical Education
admission requirements to the Division of, 53
professional program for men, 171
courses in, 277
professional program for women, 173
courses in, 280
required program, 169
Physical Education Requirement 14, 30, 169
Physical Sciences
courses in, 285
general education sequence in, 137
Physics
advanced placement credit in, 59
courses in, 285
curriculum in for B.S., 156
departmental distinction in, 156
general education sequence in, 137
major in, 156
minor in, 156
teacher education in, 156
Physics, Applied (Major in), 110
Physics Curriculum (B.S.), 156
Placement Services (Job), 43
Placement Tests (New Registrants), 63
Plastic and Graphic Arts
courses in, 288
major in, 75
Political Science
courses in, 296
departmental distinction in, 158
general education sequences in, 137
major in, 157
minor in, 158
teacher education in, 158
Predentistry, 52, 134, 165
Preforestry, 134
Prejournalism, 134
Prelaw, 134, 164
Premedicine, 134, 165
Prenursing, 52, 134, 167
Prepharmacy, 51, 134, 167
Preprofessional Programs, 164
Preveterinary Medicine, 52, 134, 167
Proficiency Examinations, 22
Program Request Conference, 64
Progressive Admission, Program of, 55
Psychology
behavioral science major in, 159
courses in, 300
departmental distinction in, 159
general education sequences in, 137
general major in, 159
minor in, 159

Quantitative Methods
courses in, 304
specialization in, 87
Quarter Hours
class standing, 31
conversion to semester hours, 29
definition of, 31

Refunds
on withdrawal from a course, 66
on withdrawal from University, 66
withdrawal to enter military service, 66
Registration
concurrent, 44, 63
dual or concurrent, 30, 44
Procedures, 63
Reserve Officers' Training Corps, 27
Residence Requirement for Graduation, 30
Rhetoric, courses in, 305
Rhetoric for Foreign Students, courses in, 306
R. O. T. C., 27
Russian, courses in, 306

Salutatorian, 20
Scholarships, 37
Selective Service Deferment, 29
Semester Hours to Quarter Hours Conversion, 29

Service Fee, 64
Social Work, Jane Addams Graduate School of, 27
Sociology
courses in, 308
departmental distinction in, 160
general education sequences in, 137
major in, 160
minor in, 160
teacher education in, 160
Soil Engineering Major, 123
Spanish
advanced placement credit in, 58
courses in, 312
departmental distinction in, 162
general education sequences in, 137
major in, 161
minor in, 162
teacher education in, 162
Special-Examination Fee, 65
Speech and Theatre
courses in, 316
departmental distinction in, 163
general education sequences in, 137
major in, 162
minor in, 163
teacher education in, 163
Speech Clinic, 24
Speech for Foreign Students, courses in, 321
Structural Design Major, 125
Structural Mechanics Major, 126
Student Activities Program, 14
Student Counseling Service, 14, 35
courses offered by, 321
Student Employment, 43
Student Handbook, 35
Student Teaching, 92
Systems Analysis Major, 127
Systems Engineering
courses in, 321
Department of, 102

Talented Student Program for Illinois High School Seniors, 21
advanced placement credit from, 59
Teacher Education, Council on, 91
Thermal Science Major, 129
Transcript Fee, 65
Transfer to Chicago Circle, 33
to Urbana, 33
Transfer Students, 46, 61
in Business Administration, 88
Tuition and Fees, 14, 64
deposit, 62

Undergraduate Study, Admission to, 49-53
United Student Aid Funds Program, 42
Urbana Administrative Officers, 11

Valedictorian, 20
Visitors, Course, 16, 65, 66

Water and Air Resources Major, 130
Wave Propagation and Radiation Major, 131
Withdrawal from the University, 33
Women's Athletic Association, 171

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